F·A·A·M facility for airborne atmospheric measurements

FLIGHT FOLDER

Flight No.	**B424**
Date:	21 Jan 2009
Take Off:	15:00:10
Landing:	20:30:02
Flight Time:	5h 29m 52s

Campaign: APPRAISE-ICE Flight
Operating Area: Chilbolton

POB	Position	Name	Institute	Logs y/n
1	Captain	Al Roberts	Directflight	
2	Co-pilot	Ian Ramsay-Rae	Directflight	
3	CCM	Dawn Quinn	Directflight	
4	Mission Scientist 1	Keith Bower	Manchester University	
5	Mission Scientist 2	Zhiqiang Ciu	Leeds University	
6	Flight Manager	Jamie Trembath	FAAM	
7	Core Chemistry	Mo Smith	FAAM	
8	AMS	Paul Williams	Manchester University	
9	Manchester Cloud	J. Crozier	Manchester University	
10	CVI / Filters	James Bowles	Met Office	
11	WAS	Jimmy Hopkins	York University	
12	WAS Training	Shalini Punjabi	York University	
13	Cloud Physics	Phil Rosenberg	FAAM	
14				
15				
16				
17				
18				

The following log sheets are not available for this flight :

Log	**Reason**
Cloud Physics Processing	Processing yet to be completed.
Core Chemistry / TDLAS	No In Flight log except in cases of instrument problems
PSAP log	No log as PSAP pump / filter info included on Flight Summary page
CVI	Awaiting confirmation of whether a log was created
WAS	WAS operator does not create a log sheet
Manchester Cloud	Manchester Cloud operator does not create a log sheet
AMS log	AMS operator does not create a log sheet

Document control

Revision	Date	Author	Comments
r0	29 Dec 2009	Doug Anderson	Initial version missing the above noted logs
r1			
r2			

Digital video recordings in avi format:

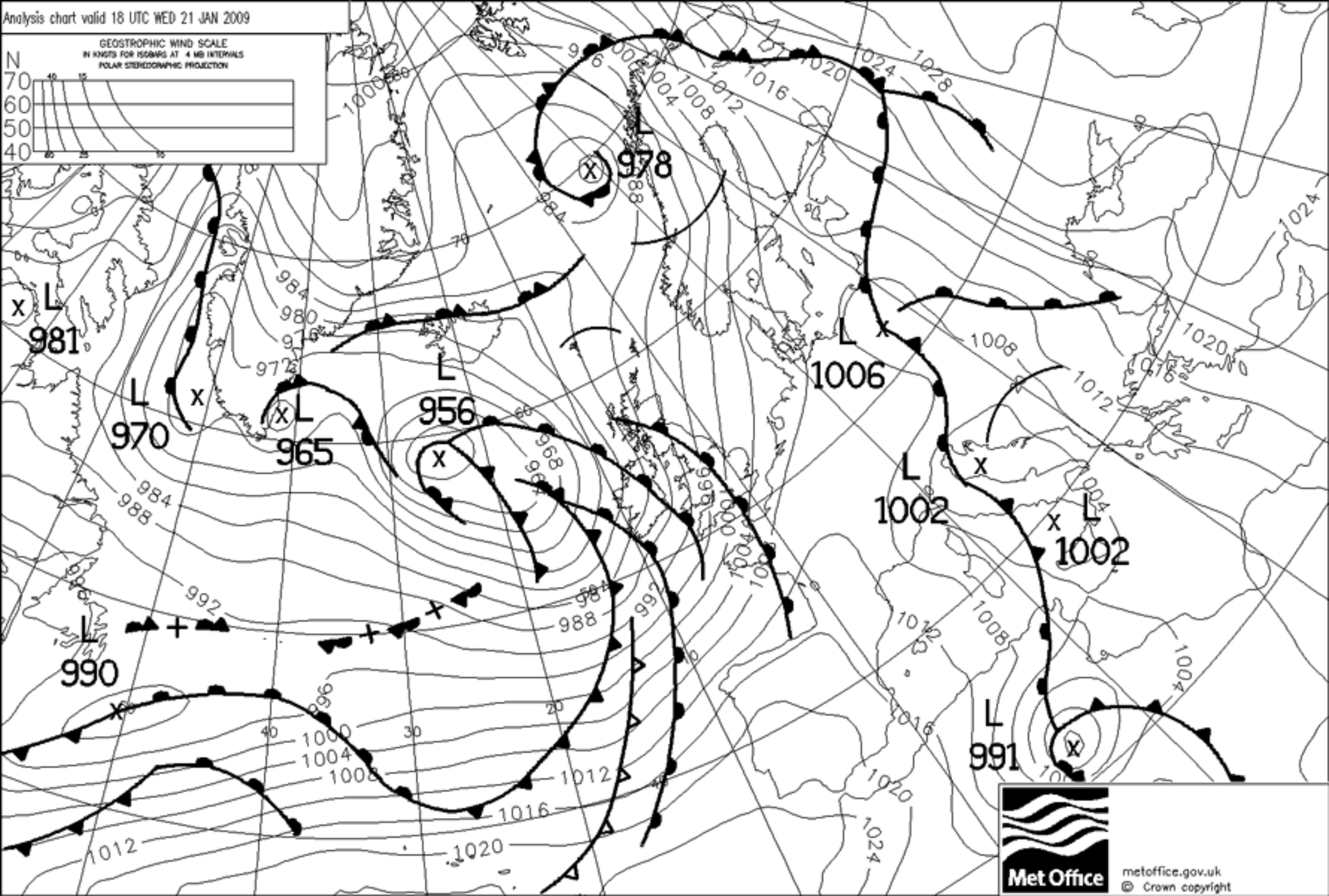
None so far.

FLIGHT SUMMARY

Flight No B424
Date:
Project:
Location:

Start Time	End Time	Event	Height (s)	Hdg	Comments
145404		ASP	0.68 kft	050	open
150010		T/O	2.5 kft	252	
150551		Video	6.8 kft	049	started
151552		note	10.0 kft	242	water measures zeroed
152107		PSAP	10.0 kft	235	Off
152151	152626	Profile 1	10.0 - 5.6 kft	169	
152949		QNH	5.5 kft	171	1001
153112	153504	Profile 2	5.6 - 2.7 kft	153	
153505	155119	Run 1	2.7 kft	213	
153543		note	2.6 kft	236	chilbolton
153812		psap	2.7 kft	250	off
153950		psap	2.7 kft	247	on
154259		psap	2.7 kft	248	off
154528		psap	2.7 kft	248	on
154701		psap	2.7 kft	248	off
155208		note	2.7 kft	151	waters zeroed
155249	160558	Run 2	2.7 kft	065	
160447		psap	2.7 kft	081	on
160553		note	2.7 kft	077	chilbolton
160653		note	2.7 kft	350	water zeroed
161006	161557	Profile 3	2.6 - 8.0 kft	233	chilbolton
161053		psap	3.2 kft	247	off
161557	162331	Run 3	8.0 - 9.2 kft	252	162215
162332	162516	Profile 4	9.2 - 11.0 kft	252	162215
162945	164441	Run 4	11.0 kft	075	chilbolton
163842		note	11.0 kft	073	chilbolton
164441	164555	Profile 5	11.0 - 12.0 kft	244	chilbolton
164555	165754	Run 5	12.0 kft	258	
165754	165900	Profile 6	12.0 - 13.0 kft	255	
165901	171714	Run 6	13.0 kft	257	chilbolton
171120		note	13.0 kft	072	chilbolton
171714	171819	Profile 7	13.0 - 14.0 kft	245	chilbolton
171819	172953	Run 7	14.0 kft	259	
172953	173104	Profile 8	14.0 - 15.0 kft	259	
173104	174955	Run 8	15.0 kft	257	
174427		note	15.0 kft	063	chilbolton
174955	175559	Profile 9	15.0 - 22.0 kft	255	
175559	175824	Run 9	22.0 kft	263	
175608		note	22.0 kft	263	water zeroed
175824	180242	Profile 10	22.0 - 16.1 kft	263	interrupt
180426	180818	Profile 10	16.1 - 12.0 kft	053	restart
180818	182048	Run 10	12.0 - 12.1 kft	070	Chilbolton
181538		note	12.0 kft	073	Chilbolton
182048	182206	Profile 11	12.1 - 11.0 kft	249	Chilbolton
182207	183451	Run 11	11.0 kft	255	
183451	183626	Profile 12	11.0 - 10.0 kft	257	
183626	185602	Run 12	10.0 kft	255	
185035		note	10.0 kft	076	Chilbolton
185523		note	10.0 kft	242	Chilbolton
185603	185726	Profile 13	10.0 - 9.0 kft	253	
185726	190808	Run 13	9.0 kft	251	
185930		note	9.0 kft	252	Lights in DFC

190809	190934	Profile 14	9.0	- 8.0	kft	251		
190935	192633	Run 14	8.0		kft	250	Chilbolton	
192138		note	8.0		kft	079	Chilbolton	
192634	193015	Profile 15	8.0	- 6.0	kft	243	Chilbolton	
192915	194051	Run 15	6.0		kft	245		
194052	194253	Profile 16	6.0	- 4.0	kft	248		
194253	195759	Run 16	4.0	- 4.4	kft	242		
195652		note	4.0		kft	079	Chilbolton	
195759	195837	Profile 17	4.4	- 5.0	kft	357		
195837	201948	Run 17	5.0		kft	085		
200135		note	5.0		kft	238	Chilbolton	
203002		Land	0.66		kft	252	Exeter	
203232		ASP	0.67		kft	068	closed	
203520		Shutdown	0.67		kft	246	50'43.93N	3'24.81W


Analysis chart valid 18 UTC WED 21 JAN 2009
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
978
981
970
965
956
1006
1002
1002
990
991
Met Office
metoffice.gov.uk
© Crown copyright

Sortie Brief: APPRAISE-Clouds: mixed-phase cloud studies
Date: 21 Jan 2009
B424 (t/o Cranfield, land away at Exeter) T/O 15:00z (~4.5hours)
B425 (t/o & Land Exeter) T/O 21:00 (~ 3.5 hours)
M.Sci: Keith Bower

Sortie Aims: To measure ice and liquid-phase microphysical processes in frontal clouds in association with the Chilbolton radar facility.

Sortie Location: Over and to the west of the Chilbolton radar facility. Area Alpha**.**

Sortie Summary: Perform a series of runs at a series of altitudes below cloud base (if possible), within and above the cloud, along the azimuth that is being scanned by the radar. Information on the run orientation and altitude to be flown will be provided by scientists at Chilbolton using VHF radio (call-sign "Radsearch"). Where the radar identifies a small-scale feature of interest, the aircraft may abort a long leg in order to turn to re-penetrate it. Where either the aircraft or radar identifies a particular horizontal layer of interest, the aircraft may fly a sawtooth pattern so as to provide a sequence of profiles through it. It is desired that the aircraft flight legs start/finish in the Chilbolton overhead. This benefits the validation of vertically-pointing radar/lidar retrievals of supercooled cloud layers. This requires turns to be done within controlled airspace and so may limit the number of occasions that this is possible.

Sortie Detail B424:

a) T+0 Take off & climb to FL100 to transit to operating area at Chilbolton.
b) T+35 When at suitable location descend from transit altitude to 1000ft agl, or to lowest altitude allowed by operating restrictions (This may only be achieved with an approach to Boscombe Down airfield - TBD). Fly 10min **clear air** leg.
c) Perform a profile ascent at 1000ft/min along the azimuth and through the cloud system up to FL330 or to above mid level cloud top, whichever is lower.
d) Fly a series of 40-60km level flight legs along the azimuth scanned by the radar at altitudes defined by the radar or as determined from previous profile. Ideally, just above cloud base, throughout the cloud, just below and just above cloud top. Duration of each leg ~10 minutes. Legs should extend over Chilbolton. During incloud legs AMS should sample off CVI inlet unless tip iced up (but sample off Rosemount inlet out of cloud). Filters to be exposed on out of cloud legs only.
e) Where the radar identifies a feature of interest or one that is penetrated by the aircraft along any leg, the leg may be interrupted to fly one or more butterfly patterns. Each butterfly consists of a minimum of two minutes straight/level that includes penetration of the feature followed by turns that allow re-penetration of the feature during the reciprocal part of the pattern.
f) Where a defined layer of interest (such as a shallow layer of supercooled liquid water) is identified by the aircraft or radar, the long leg may be flown as a sawtooth leg with ascents/descents at 1000ft/min, extending 1000ft above and below the layer level (M.Sci may request level segments of 1 minute).
g) Repeat items d) to e) as long as flight endurance or cloud conditions permit.
h) End with below-cloud clear air aerosol leg (10 min) if possible, before recovering to destination airfield.

Sortie Detail B425: as above except for takeoff and transit from Exeter airfield

PROJECT BRIEF: APPRAISE-Clouds – mixed-phase cloud studies

Scientific Aims: The purpose of this project is to obtain detailed microphysical measurements in stratiform cloud systems, altocumulus clouds, wave clouds and cumulus clouds within the temperature regime in which ice particles will likely co-exist with liquid (typically 0 to -30C).

The flight plans are designed to characterise the aerosol above and below the cloud and infer aerosol fluxes into the cloud layer by combination with the vertical wind measurements and the microphysical characteristics within the cloud layer.

Constant altitude flight legs of approximately 50 km (10 minutes flying) will be made:

• In the boundary layer to measure the aerosol size distributions (from 10 nm to 100 um), CCN, aerosol composition from 30 nm to 1 um using the ToF AMS; larger particles and non-volatile material such as refractory material will be measured using EDAX analysis of filter samples.

• Near cloud base within cloud to measure the cloud droplets that have been activated from CCN, interstitial particles and larger particles that have fallen from cloud top. In addition the onset of ice will be observed using the CPI, CAPS and 2-D probes in cloud.

• Middle of the cloud passes will be made at temperatures where key processes will be expected to be initiated (-6C to -9C) for the Hallett-Mossop process or around -15C where fragmentation of dendritic crystals may be important.

• Near cloud top and within the cloud to measure entrainment and aerosols within entrained eddies and ice particles within the cloud; in colder clouds ice initiation will occur in this region.

• Above the cloud to measure the properties of aerosol particles that can potentially be entrained into the clouds.

In-situ measurements from the aircraft are performed in close coordination with the CAMRa radar and lidar facilities at Chilbolton, Hants.

Weather conditions: Stratiform, or altocumulus clouds lying over and to the west of the Chilbolton radar facility. This may or may not be generating precipitation at the surface. It is particularly desirable if the mean wind direction lies between about 220 and 280 degrees. This allows the aircraft to fly legs along the radar beam whilst staying closely parallel to the mean wind direction.

Key instruments and their operation.

Basic meteorology

- Rosemount temperatures, GE hygrometer, CR2
- GPS, INU, turbulence probe – When in supercooled liquid water, Flight Manager or PIs should monitor turbulence probe calibrated differential pressures for signs of icing (cessation of variability on signal).

Cloud/Aerosol Physics/Chemistry

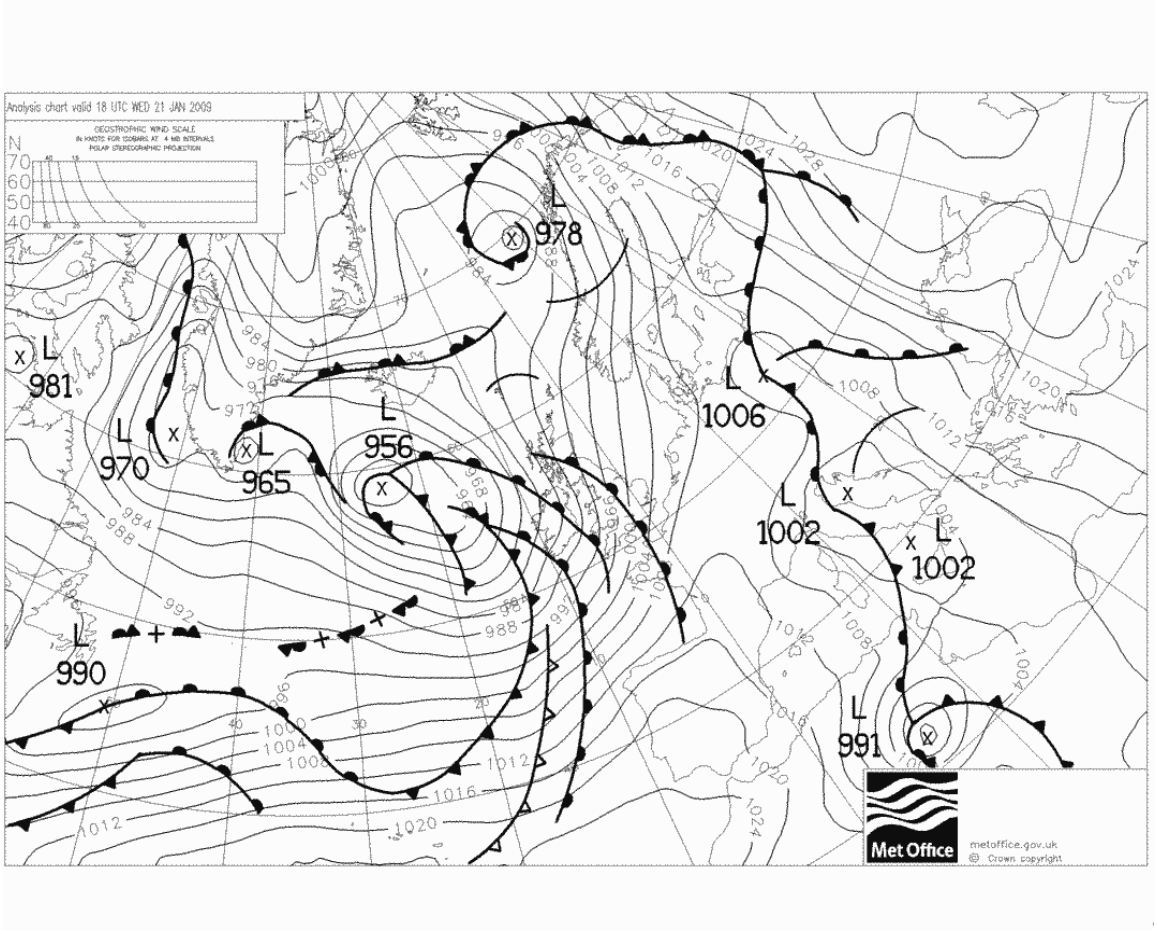
- FFSSP, 2DC, 2DP, PCASP, CDP. Normal monitoring to ensure correct operation. Operator should note particular features of interest eg. high concentrations, appearance of pristine ice crystal habits, appearance of large drops (>100micron) in 2D imagery when above freezing level.
- 2DS, CAPS and FSSP – as above
- J-W LWC and Nevzorov LWC/TWC. Where a run is only partially in cloud and is starting in clear air, these should be zeroed/calibrated and a note made in the Flight Manager's log.
- TWC. If possible, a profile in clear air is desirable for calibration purposes.
- AMS, SMPS/WCPC (- to sample off both Rosemount and CVI inlets)
- Filters

CVI inlet sampling: residuals (and Lyα) incloud; aerosols out of cloud (PCASP, CPC)

<u>Mission Scientist Debrief: APPRAISE-Clouds: mixed-phase cloud studies</u>:
Flight Number: B424, 21st Jan 2009 (T/O Cranfield 15:00; Landing Exeter 20:13)
Mission Scientist: Keith Bower

Sortie Aims: To measure ice and liquid-phase microphysical processes in frontal clouds in association with the Chilbolton radar facility.

Weather conditions & operating area: An area of low pressure was deepening in the N. Atlantic to the NW of the British Isles (SW of Iceland), generating a series frontal systems that were approaching the UK from the west. The first of these was a warm front the middle level cloud from which was predicted to arrive in the vicinity of the Chilbolton area by mid afternoon, with the bulk of the associated precipitation expected to arrive by 6pm. Take off time (15:00) was thus set to catch the arrival of the mid level cloud whilst still allowing for the possibility of measuring some aerosol at lower levels in cloud free conditions before the arrival of the lower level cloud and heavy precipitation. To facilitate this take off time and a full length mission the aircraft needed to land at an airfield that would be open after 19:00. Exeter was chosen. Another option considered was to land early (after 4-4.5 hrs) refuel and take off again for a shorter second mission to sample the frontal system over an extended period. During the flight it was decided to carry out a single full length flight and then prepare for a second mission the next day in other frontal systems coming in from the west.



Summary of the flight: During the transit out to the Chilbolton area (FL100, 696mbar, -14.3 to -12.0°C) in clear air, the bank of mid and upper level frontal cloud could be seen out to the west in the distance. It was decided that in the absence of low level cloud (and in the interest of time) a missed approach to Boscombe Down airfield was not required in order to carry out aerosol measurements at low level. Instead a profile down to 2.6kft (the minimum safe operation altitude (msa) over the Chilbolton radial terrain) was carried out and an SLR R1 (918mbar, 1.1°C) started on the 255 radial outbound from Chilbolton (CH). Filters were started at 5.5kft during descent P2 and continued during R1. Half way along the run a patch of low cloud and precipitation (rain) was encountered so filters were switched off. The plane flew into more pockets of rain along the run before entering solid low cloud (3 minutes) before the turn at the SW end of the radial. A reciprocal run (R2) was carried out, inbound at the same altitude to maximise the measurement of aerosol possibly feeding into the cloud system. In clear air sections, PCASP saw 20 cm^{-3}, the wCPC saw 2500 counts and CAS 15-20cm^{-3}. AMS measured low loadings, ~ 0.2g m^{-3} sulphate and organic and half that loading of nitrate. The SMPS saw modes at around 300-350 nm and again at 50nm. Both the 2DC and CIP100 (PIP) saw drops during periods of rain. On the inbound leg R2, Chilbolton advised they were seeing thick ice cloud overhead between 1.5 and 7km (5-23kft), with an enhanced region of differential reflectivity at 1.1km (3.6kft).

After passing overhead Chilbolton (CH) inbound and in the turn at Pepis, a profile ascent P3 was started overhead CH outbound. At 3.6kft (825mbar, -0.82°C) a diffuse cloud base (CB) was encountered. 2DC saw >100 $litre^{-1}$ of cloud particles, while the FSSP concentration was “not high”. 2DS was seeing capped columns. P3 was terminated at FL80 (752mbar, -8.2°C) and R3 started (40% along radial leg). This was the start of series of profile ascents/descents and SLR legs through the frontal cloud system along the 255 radial from Chilbolton. Outbound SLRs were generally terminated prior to arriving at the SW end of the run, and profiles to the next level completed before making the turn. The altitude of inbound SLRs was maintained after passing over CH and in the turn at Pepis, until passing over CH again. A profile change in altitude was then undertaken at or just after passing the CH overhead, outbound. The tables below summarise these changes and comment on the main observations during each run.

SLRs R3, R4, R5, R6, R7 and R8 were carried out at ascending levels through the cloud (following profile ascents P3, P4, P5, P6, P7, and P8) (Table 2). A profile ascent P9 was then carried out (outbound from Chilbolton) up through the remaining cloud to above cloud top to FL220. The main CT was observed at ~ 21kft (445mbar, -29.1°C) half way along the leg, although the aircraft popped out through a lower CT at 16.6kft (534mbar, -20.0°C) closer to Chilbolton. R9 was carried out at FL220 for 3 minutes in clear air (still going outbound). There was cirrus cloud above but no obvious precipitation particles were detected by any cloud probe. After various instruments had had their calibrations checked, a profile descent P10 was carried out for the remainder of the outbound leg, interrupted at FL160 (547mbar, -18.2°C) for the turn at the SW end of the radial, and then continued down to FL120 (643mbar, -11.1°C). This level was chosen based on information from Chilbolton (MSci2) of there being high Zdr at 3.5-4km (12-13kft) hence P10 would profile through into this layer. R10 was carried out inbound to Chilbolton at this level of interest.

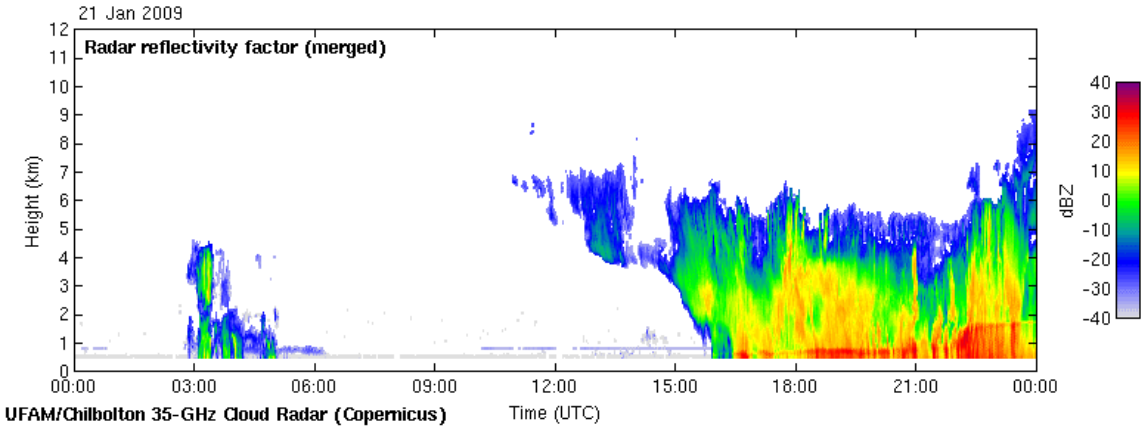
Table 2 – ascending SLRs

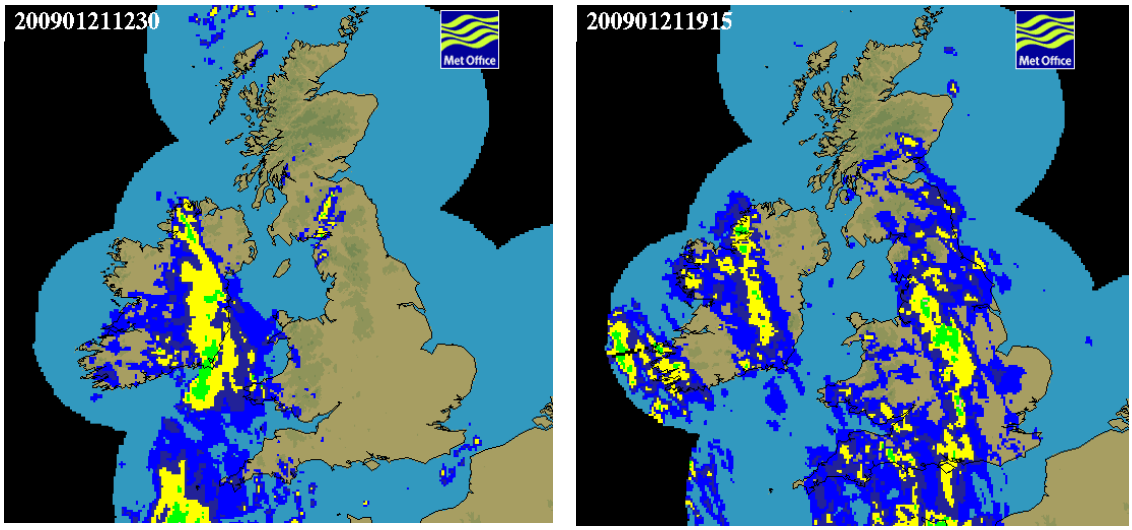
P # u/d Run #	in/out bound (I /O)	Flight level	Run Pressure (mbar)	Temp start/end SLR(°C)	Comments/observations
P3 u R3	O	FL80	752	-8.2 -7.1	Ice ppt – "big splodges", 2DC 60 L^{-1} small ice aggregates CIP 100 L^{-1} mode 200µm varied habit CAS <5 cm^{-3}
P4 u R4	I	FL110	670	-11.7 -12.8	CVI tip iced up, AMS on Rose (MSmode) 2DS larger messier aggregates, 2DC 50 L^{-1} aggregates, CAS ~5 cm^{-3} mode 20µm, PIP mode ~1mm intermittent bimodal 1mm/100µm, some icing on turbulence probe – lost TAC. MSci sees visible structure in cloud during CH turn.
P5 u R5	O	FL120	644	-14.3 -12.2	PIP bimodal dist'n 1mm/100µm 2DS mainly agg, occasional pristine crystal CIP mode 200-300µm + few mm columns CAS 20µm mode, FSSP same (~5cm^{-3}) 2DS more ppt towards end R5
P6 u R6	I	FL130	619	-13.0 -15.7	Core cloud seeing pristine snow, 2DS/CIP too. Snow and turbulence inbound in turn at CH, then out of cloud after turn
P7u R7	O	FL140	595	-16.6 -14.8	2DC 20 L^{-1} aggregates (800µm) PIP peak ~15 L^{-1} CIP ppt 200 L^{-1} (300µm) CAS 20µm mode 5 cm-3 2DS sees small stuff CIP in smallest channel too …then big ppt too. Radar – CT falling to 5km/16.4kft shear layer 3km/9.8kft
P8 u R8	I	FL150	571	-16.3 -16.6	P8 2DS pristine snow; R8 CVI unblocked 2DS/CIP – pockets liquid H20 along R8 PIP bimodal at times 100µm/1mm. MSci2 – high Zdr 12-13kft lost pitot static p (static p OK on CAPS) CVI blocked end R8.
P9 u R9	O	FL220	428	-30.9 -30.8	P9 Out of CT 16.6 kft(534mbar, -20.0°C) back into cloud at 19.5kft (2mins) Main CT 21kft(445mbar, -29.1°C) R9 Cloud Free – no ppt from Ci above

A series of SLRs R10, R11, R12, R13, R14, R15 and R16 were then undertaken at successively lower levels through the cloud (Table 3), down to the lowest level of FL40 (R16 inbound at 874mbar, from +0.7°C SW end to -0.5°C CH end). This was followed by a climb (P17) back up to FL50 for the final outbound leg and recovery into Exeter airport. Earlier (~18.02z - during P10), Chilbolton suggested the melting level was at 2.2km (or 7.2kft), so this set of SLRS and profiles was designed to pass through this level of interest, although temperatures measured on the aircraft suggested the melting level was much lower than this at around FL40 when the aircraft got to this temperature range. The aircraft recovered to Exeter and landed (in a 45kt crosswind!) at 20:13z.

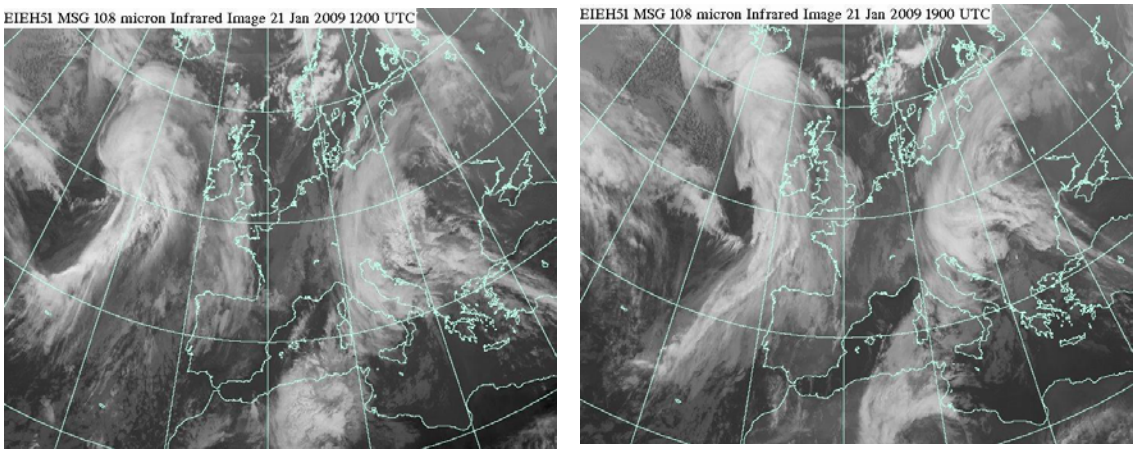
Table 3 – descending SLRs

P # u/d Run #	in/out bound (I /O)	Flight level	Run Pressure (mbar)	Temp start/end SLR(°C)	Comments/observations
P10 d R10	I	FL120	643	-10.6 -12.6	During P10 (12.9kft) 2DS/CIP saw snowflakes. Turbulence probe well iced up. R10 Aircraft anti-ice detected liquid
P11 d R11	O	FL110	668	-11.2 -8.4	2DC <10 L^{-1}; PIP ~10 L^{-1} snowflakes 2DS snowflakes CAS 20µm particles (2cm^{-3}) CIP 50 L^{-1}ppt (always show large # in smallest bin too?) FSSP 20µm mode <10cm^{-3} (~1cm^{-3}) [Chilbolton: enhanced Zdr signal at 2km (6.5kft) – melting layer 25 km west !!] 6minutes later… Aircraft anti-ice detected liquid, all m/phys probes see drops: 2DS/CIP see drops ~120µm well distrib'd PIP bottom channel too FSSP; drops 50cm^{-3} 10µm – shrinking to 2µm (5-10cm^{-3}) CIP (120µm to lowest channels) bimodal – large mode shrinking CDP only low concs (<1cm^{-3}) Shattering??
P12 d R12	I	FL100	695	-6.0 -10.0 -9.3	All turbulence signals lost now – fully iced Strong ppt now 2DS/CIP 120µm doughnuts 2DC doughnuts 300 L^{-1} (was 1000 L^{-1}) then only snowflakes Q (from radar) any evidence of falling crystals? Yes (2DS/CIP)
P13 d R13	O	FL90	723	-8.3 -7.3	P13 Aircraft anti-ice detected liquid [Chilbolton: patches high Zdr 1.7/2.2km 5.5/7.2kft 40km west]
P14 d R14	I	FL80	751	-5.8 -4.6 -5.7	2DC – liquid drops, needles, columns PIP – needles, columns (800µm) CIP – needles (500µm) Then … 2DS – capped columns – more ice than before – rimed frozen drops? Chilbolton fall streaks 40km west 4-6kft Over CH 2DS – good mix small drops – larger ice (inc some columns)
P15 d R15	O	FL60	810	-3.1 -1.3	2DC/PIP : water drops – range of sizes (250 L^{-1} / 40 L^{-1}) 2DS drops sticking together 100-300µm FSSP 2cm-3 mode 15-20µm (1st channel) CDP – concs not high enough can't see, Q - droplet shattering?? Lost Nevzorov again
P16 d R16	I	FL40	873	+0.65 -0.52	2DS/CIP occ large blobby thing melting ice? Turbulence here – many pockets Lots ice again over Chilbolton
P17 u R17	O	FL50	843	-1.6 -0.93	Q did the turbulence probe defrost?





Rainfall radar images showing frontal rainbands before (12:30) and during (19:15) flight B424

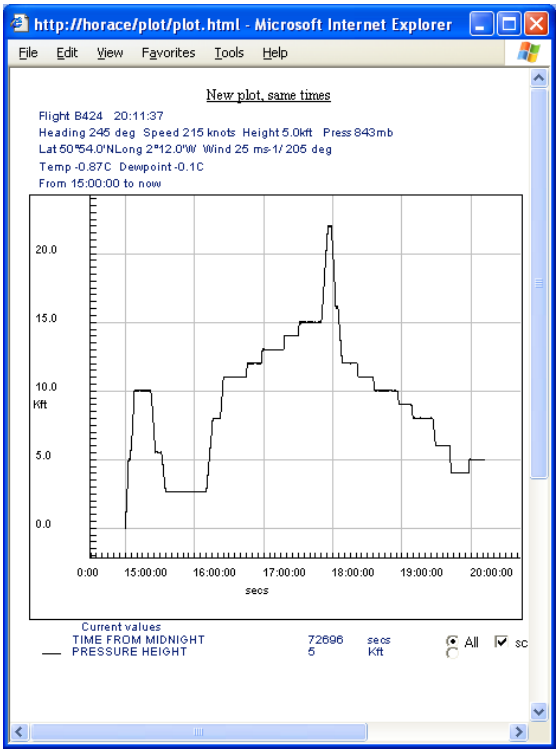


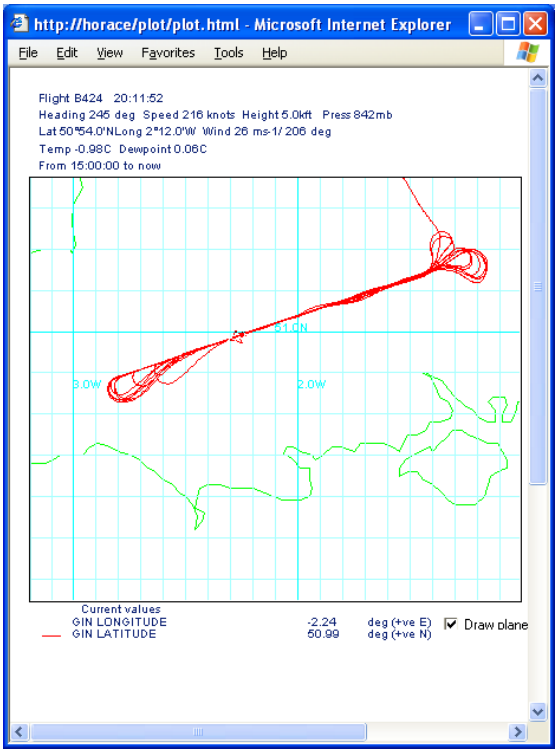
IR satellite images showing progression of cloud associated with warm front sampled during B424

Notes on instrumentation: *(For full list of instrumentation functionality see flight log)*

CPI - not present for this flight
Nevzorov total water probe – failed during flight again
CVI – tip iced up for much of flight
Turbulence probe - also iced up to increasing degrees during flight

Final comments: For further information about flight refer to Mission Scientist log sheets and screen dump file.





Mission Scientist's Log [APPRAISE-CLOUDS]

Flight No B.424 Date 21/07/09 Name K.N. Bower Page 1 of 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
14 50 00 – 14.52.30	(KNB	tbm)			Engine Starts N°4 – N°1
14.54:11	(KNB)				Taxi QNH 1000mb (510 Kt)
15.00.23	"				Rolling
15.00 50	"				T/O
					Med level cloud above + Wet
		4500			~~QNH~~ (set p to 1013mb)
15:07:59	Trans	FL100	291	52°10'/0°24'	[696 mb -14.18°/-30.88°C 17 m/s/231°]
15.14.56	Trans	FL100	242	52°06'/1°6'	[696mb -14.34/-28.77°C 14m/s/236°]
15.20.00	Trans	FL100			Into the medium level cloud
15 21.17	Trans turn	FL100	221	51°54'/1°42	[696mb -11.92°C/-13.15° 11m/s/256°]
15.21.49	P1 start	FL100	171	51°54'/1°42'	[696 mb, -12.09°/-12.71, 10m/s/256]
15 24 35	P1	7.4kft	172	51°42'/1°36'	[769mb, -8.12°/-10.53°C 14m/s/236]
15.26.26	P1 end	5.5kft			
15.28	Trans	5.5kft			Filters on & filter run
					Barometric QNH ~~1005mb~~ 1001mb (use 1000)
15.30.36	Transit Turn	5.5kft	171	51°18'/1°30'	[826mb, -4.71°/-9.45°C 12m/s/220°]
15.31.11	P2 start	5.5kft	153	51°18'/1°30'	@ 2.3kft on ~~1000~~ 1001mb
	P2				RADSENSOR
15.35.03	P2 end/R1	2.6kft	213		2300ft [1.09°C/-1.04°C 919mb 1Kmls/205°]
CM 15 35 43	R1	2.6kft	247	51°6'/1°24'	Orientated Chilbolton [1.35°/-0.28°C 15/208° 920mb]
					PCASP with – 20 nm 10 bin
					CPC - 2500 counts from 50 cm³
					CAB 15–20 cm³
15 40.15	R1	2.6kft			Cloud - Filters closed

Mission Scientist's Log

Flight No B.424 **Date** 21/01/09 **Name** K.N. Bower **Page** 2 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
					some rain on front
15:40:36	R1	2.6kft	250		SR [919mb 1.33°/0.42°C 16m/s/204°]
					Nadir dense (2DC)
15:42:56	R1	2.6kft	248	51°0'/2°0	Cloud + ppt – Filters all [1.18°/1.46°C 17/206°]
15:43:45	R1				Rain on windscreen
15:47.00	R1	2.6 kft	248	50°54'/2°24'	PPt again [1.58°/1.12°C 919mb 15m/s/202°]
					PCASP - 20 2DC + PIP
15:50.16	R1	2.6kft	248	50°54'/2°42'	(RADSEMCH – Cirrus) mb cloud again
15:51.17	R1 end	2.6 kft	247	5°48'/2°42	[919mb 1.91/1.69°C 1Kmls/206°]
15.52.45	R2 st	2.6 kft	68	50°48'/2°42'	[918mb 1.54/2.11°C 15m/s/204°]
					AMS – small bodies 0.2 SO_4/0 org/0.1 NO_3
					SMPS – total N' 350–300 + 50nm mode
15.55.13	R2	2.6kft	79	50°54/2°30	919mb, 1.82/2.15°C 1Kmls/199 (Free of CB base part)
16.57.40	R2	2.6kft			PIP- 0.001 cm² p.t
					CB 1km
					RADSEMCH band to cloud ended 1500m–7000m
					above 3500m–3200m
					N 000° echoes region dft left
					Summer call.
16.05.54	R2 end	2.6kft	77	51°6'/1°24'	at Chilbolton [919mb 1.32/-0.23°C 15m/s/206°]
16.10.04	P3 st	2.6kft	234	51°6'/1°24'	2200ft off Chilbolton (cloud core) [1.44°/-0.43°C]
16.11.26	P3	3.6kft	257	51°6'/1°30'	dilhus CB [-0.82/-0.97°C 985mb 17/205°]
					2DC - > 100/l
					FSSP - not h

2DS' Carpeted Columns now.

~~2–11 000 ft — ft 50~~

Mission Scientist's Log

Flight No B424 **Date** 21/01/09 **Name** K N Bower **Page** 3 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
16.15.55	P3 and P2	FL80	252	51°0'/1°54'	[-8.2°C/-8.87°C 752mb 14m/s/229°]
					hw ones on CAS <5cm^{-3}
					Ice ppt – big "splodges"
					2DC - small ice – blobby agglom's 60/litre
					CDP: CAS 5cm^{-3}
					CIP 100/litre 200μm mode-varied habit
16.22.15.	P3 and P4	FL80	251	50°54'/2°24'	[-7.06°/-7.33°C, 752mb, 21 m/s/233°]
					CVI trip – fully iced on rad
					PCASP also – rain
16.25.13	P4 and P4	FL180	251	50°48'/2°42'	[-11.67°/-12.04° 670mb 16m/s/243°]
					AMS – still on Rose on MS obs: 1
					2DS CAS similar ones to before.
					Larger – messier Xtals – aggs inc.....
					2DC – ~50 l^{-1} aggregates too
					PIP – mode bit less 1mm
					CAS mode at 20μm
					Xchat:- (1500ft)
					Drops buried 3.4–3.7km – SC above
					growing Xtals
					PIP – seen intermittent bimodal (1mm/100/m)
CN 16.36.41	R4	FL110	73	51°6'/1°24'	Overhead Chilbolton [669mb -12.81°/-12.32 10m/s/280]
					lost TAS diff – icing on stub probe
					MSi – I can see structure in cloud ahead

CAS – mode – 20μm
CIP – less

15:00 – 20:15 hrs

Mission Scientist's Log

Flight No B424 **Date** 21/01/09 **Name** K. N. Bower **Page** 4 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
16.44.40	R4end/R5	FL110	244	51°6'/1°24'	[-12.85 / ~ R.28 669 mb 18 m/s / 251°] ov-CH
16.45.53	R5end/R5	FL120	258	51°6'/1°30'	[-14.28/-14.15 °C 644mb 13 m/s/263°]
					Above CT now
					Ci- Ci
					Cire Cloud - Bimod distn 1mm / 100μm PIP
					CIP - mode 200-300μm (few cl mm sized ppts)
					OAS 20μm mode
					2DS - occasn pristine - mainly aggregates
					FSSP - mode at 20μm (of order 5 cm^3)
16.57.29	R5		254		CPI - more pot now
16.57.53	R5end/R6	FL120	254	50°54'/2°36'	[-12.19/-11.72 644 mb 24 m/s/255°]
16 58 59	R6end/R6 skid	FL130	257	50°48'/2°42'	[-12.99/-12.25°C 619 mb 21 m/s/276°]
					and turning next.
					Cire Cloud - pristine Snow - CPI too
17.00.35	R6	FL130	60	50°46'/2°42'	end of turn - [-12.45°/-12.1°C 618mb 21 m/s/305°]
17.05.16	R6	FL130			Cire Cloud - end pt now (↖ snow, turbulence in turn)
CH 17.11.20	R6	FL130	72	51°6'/1°24'	Old Cirl bottom [619 mb -15.71°/-15.44 14 m/s/280°]
					Out of cloud here
CH 17.17.12	R6end/R7	FL130	245	51°6'/1°24'	[-15.65/-15.15 619 mb 21 m/s/257°] (13.0 kft) OH Cirl bot
17.18.17	R7end/R7	FL140	259	51°6'/1°30'	[-16.55/-16.47 595 mb 23 m/s/259] (13.9 kft)
17.20.15					pot back (CPI)
					cire cloud concs: 20 l^{-1} 2DC ppts (800μm)
					PIP: peaks 0.015 cm^{-3}
					CPI - mode 200 l^{-1} pot ~ 300μm CIP
					OAS 20μm mode 5 cm^{-3}

17:22.20.

- 2DS - seem small stuff } 6 pieces ??
- CIP too ← smallest channel
- big ppt back

Mission Scientist's Log

Flight No B.424 **Date** 21/01/09 **Name** K.N. Bower **Page** 5 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
17.23.13					Clear Slot – Forward Upper Right
17.22.54	R7	FL140	258	51°0'/1°54'	[– 15.67°C/–15.0°C, 595mb, 26m/s/270° (13.9 kft)]
17.26.00					Radar – CT – descending 5km → (16.5 kft)
					(Xdot) shear layer 3km → (10,000ft)
17.29.52	R7end/P8start	FL140	259	50°54/2°36'	[–14.8°/–13.31°C, 595mb/1Kakft, 25m/s/278°]
					OPI messin – pristine snowflakes fall
17.31.03	P8end/R8	FL150	257	50°54/2°42'	[–16.32°/–14.75°C, 571mb/15kft 23m/s/277°]
					CVI – unblocked – (Pump on – CPI rack)
17.32.24	R8	FL150	196	50°48'/2°48'	[–16.8°/–13.99°C 574mb/14.9kft 7m/s/225°]
					Term – identifying SC H2O – important
17.36.45	R8	FL150	69°	50°54'/2°18'	CPI – supercooled water now
					– pockets along run. [–16.63°/–14.78°C, 571mb]
17.42.25					~~CPI~~ PIP – bimodal: 100μm/1mm at times
17.42.31	R8	FL150	68°	51°6'/1°36'	PIP bimodal – Term [–16.32°/–16.28° 571 (83/259 ??)] Wrong
					MSc2. high Zdr – spectral width S1
					@ 3.5–4km (12000ft)
					also – weak signature 3.5km
					– Flight Man – gust lock pitot static p
					(– still have static p on CAS)
CH 17.44.19	R8	FL150	68°	51°6'/1°24'	Overhead Chilbolton [–16.94/–16.99, 571, 83m/s ??]
					–16.94°C / 16.99
					CVI – blocked again
CH 17.49.53	R8end/P9	FL150	255		– Over CH again [–16.62/–16.82 571mb, ✗]
17.51.31	P9	16.6kft	262	51°6'/1°30'	Out of CT now 534mb
					(–19.97°/–18.45°C) 56/69° – still wrong.

Mission Scientist's Log

Flight No B.424 **Date** 21/01/09 **Name** K.N. Bower **Page** 6 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
17.53.44	P9	19.5kft	262°	51°0/1°48'	Back in downdraw [473mb -27.14/-25.79, bad wind]
17.55.01	P9	21.0kft	263°	51°0/1°54'	Through Main CT [-29.11/-28.19°C, 445mb]
17.55.86	end P9/R9	FL220	283	51°0/2°0'	[-30.96°/-35.37°, 428mb/21.9kft ~~65/64°~~]
					CT - generally ~21000ft
					Ci above — no ppt from it on any probes
					(levelling for zero/calcs of instruments)
17.58.23	R9 end/P10	FL220	263	50°54'/2°18'	[-30.52°/-424°, 427/22kft ~~57 m/s/62°~~] (Iced) *
18.00.11	P10	FL200	261	50°54'/2°30'	[CT] [-26.0°/-32.12 465mb ~~28 m/s/57~~] (Iced) *
18.02.40	P10 int	FL160	259	50°48/2°42'	[Ready to turn -16.16°/-16.85C 547mb]
					Cwlbottom 2.2km Melting level
					TWC — v important to look at....
18.04.25	P10 recc	FL161	53	50°48'/2°42'	[-18.33/-16.33, 54mb/, ~~74 m/s/264~~] (Iced)*
18.08.17	P10 end/R10	FL120	70	50°54'/2°18'	-10.56/-9.2°C 643mb - "Wind no good reading" *
18.07.15	P10	FL129	70	50°54'/2°24'	-12.12/-10.7°C 620mb — "Snowflakes" CPI
18.11.15	R10	FL120	71	51°0/1°54'	Aircraft ice detection [-11.13°C/-10.72° 643mb]
18.15.28	R10	FL120	73	51°6'/1°24	Over Cwlbottom [-12.69/-12.41 643mb]
18.20.46	R10 end/P11	FL120	249	51°6'/1°24	Over Cwlbottom -12.64/-12.33 643mb
18.22.04	P11 recc/R11	FL110	255	51°6'/1°30	E 11.23/-10.18° 608mb 38m/s/81°C]
	R11	FL100			Core Cwl: Snowflakes 2DC <10 /litre
					PIP 0.001 cm^3
					2DS :- Snowflakes
					CAS : 20μm particles (2 cm^3)
					CIP : 50/litre ppt.
					PSSP 20μm mark <10cm^{-3} = 1 cm^{-3}

CIP always shows considerable N° in smallest bin

~~11.30 T/O Kent Co~~ ~~23~~

Mission Scientist's Log

Flight No B424. **Date** 21/01/09 **Name** K.N. Bower **Page** 7 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
					Outbound - conditions
					- enhanced 2hm → Melting layer
					(Spectral width related to turbulence)
					2dr enhanced 25km west Chilbolton.
					(2hm kml) ≡6500ft
					Icing - Raindrops - CPI
					└ (a/c anticing detection)
					Well distributed drops - 120μm (CPI)
					PIP - bottom domed peak
18.29.42	R11	FL110	255	50°54'/2°12'	[-8.82°C/-7.26°C, 667mb - Undriced]
					Well defined peak PSSP 10μm (50cm⁻³)
					(CPI) banded CIP (liquid drops. Cell on plots showing)
					graded shard of larger mode
					120μm → lowest cut-off
					PSSP mode shards - 2μm - 5-10cm⁻³
					CDP - not real amounts low one <1cm⁻³
18.34.53	R11 end/R12 start	FL110	257	50°54'/2°36'	[-8.36°C/-6.45°C, 669mb - Turbulent]
18.36.25	R12 end/R12 st	FL100	255	50°48'/2°42'	[-6.02°C/-4.76°C 695mb - Turbulent]
					AM turb lost now.
18.40.20	R12. SLR	FL100	52	50°54'/2°36'	TAS - RVSM - not turb probe ∴ TAS is OK.
					ppt - strong most at 120μm 2DS } droughts
					CIP }
					2DC - droughts - was 1000 l⁻¹
					now 300 l⁻¹

Mission Scientist's Log

Flight No B. 424 **Date** 21/01/09 **Name** K. N. Bower **Page** 8 **of** 10

	Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
	1849.12	R12	FL100	76.	51°6'/1°30'	2DC - snowflakes - not deep, hooks. raw.
CH	18.50.37	R12	FL100	76	51°6'/1°24'	Over Chalbalton [-9.96/-8.17°C; 695mb]
						2.7–3.5km - Chalbalton - is there
						endine of large falling ice X'tals?
						CPI - Yes. ✓
CH	18.55.21	R12	FL100	242	51°6'/1°24'	Over Chalbalton [-9.68/-8.21°C 695mb]
	18.56.03	R12end/R13	FL100	252	51°6'/1°24	Ice detected (big Hail) [-9.29°/-8.55°, 696mb]
	18.57.25	R13end/R13	FL90	251	51°6'/1°36'	[-8.25°/-7.21°C 723mb thinks needle]
						Chil= patchy high 2dr 1.7-2.2 km (6.5kft)
						40 km West of CH.
						Chil - CT....
	19.08.07	R13end/R14	FL90	251	50°54'/2°24'	[-7.28/-6.22°C 723mb 24m/s/224°]
			~~FL80~~			
	19.09.33	R14end/R14	FL80	251	50°54'/2°36'	[-5.75/-2.57°C, 751mb 38m/s/208°]
						2DC - liquid drops + needle + columns.
						P10 - needles + columns (800µm)
						CIP (cross) - needles 500µm
	19.13.53	R14	FL80	76	50°54'/2°12'	CPI Capped Columns [-4.64/-3.07°C 752mb]
						- more ice here than before
						Rimed - bigger drops - CPI
CH	19.21.36	R14	FL80			Over Chalbalton [-5.63°C/-5.03° 752mb]
						Thinks probe still iced despite warmer T.
						Chalbalton - repeats full streaks 40km W of 4-6000ft
						stuff packed.....

16:15 – 18:50 = 35 mins/cycle

0500 ft

C1 C3
7 4
5 5.
3

Mission Scientist's Log

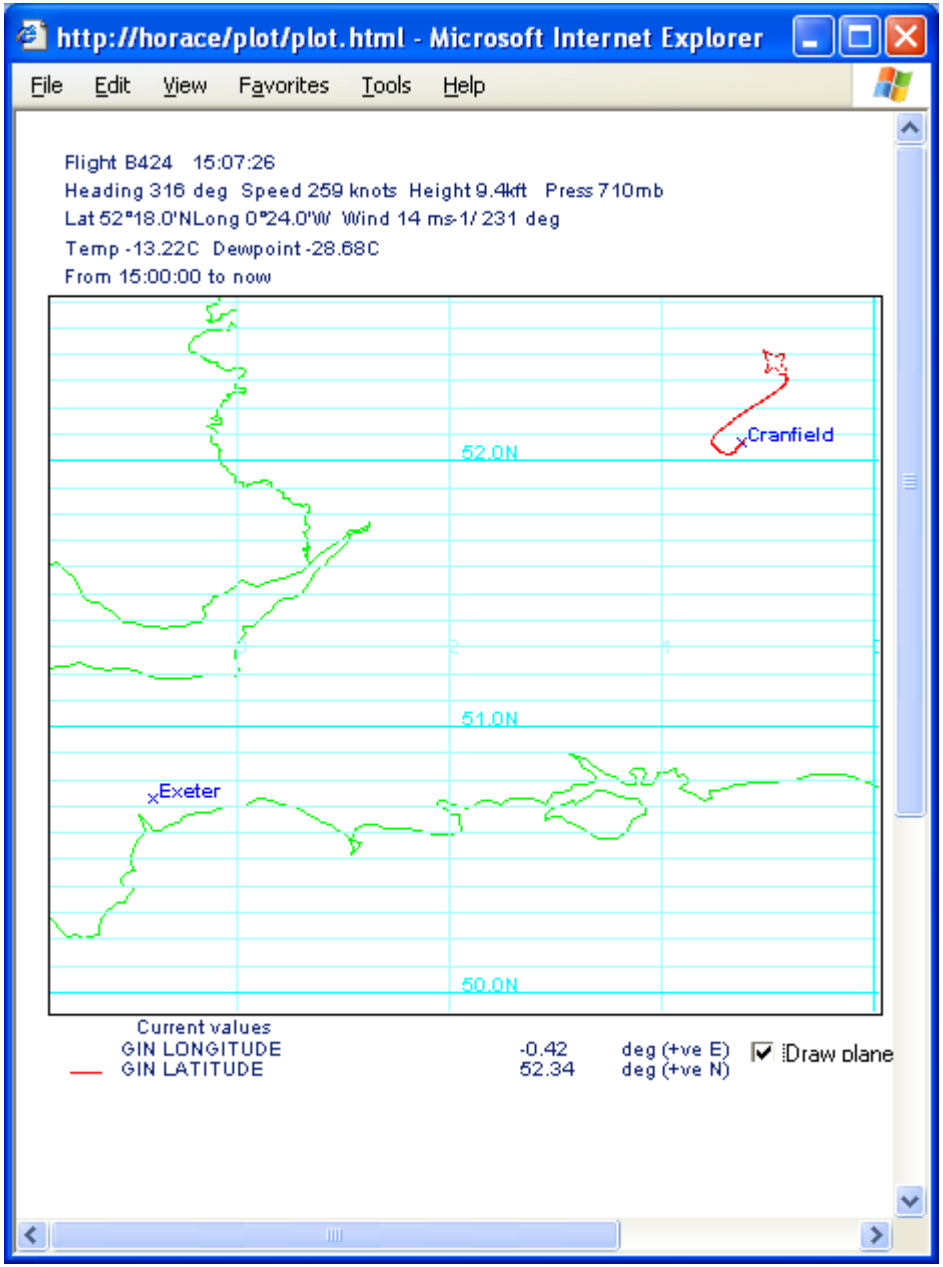
Flight No B.424 **Date** 21/01/09 **Name** K N Bower **Page** 9 **of** 10

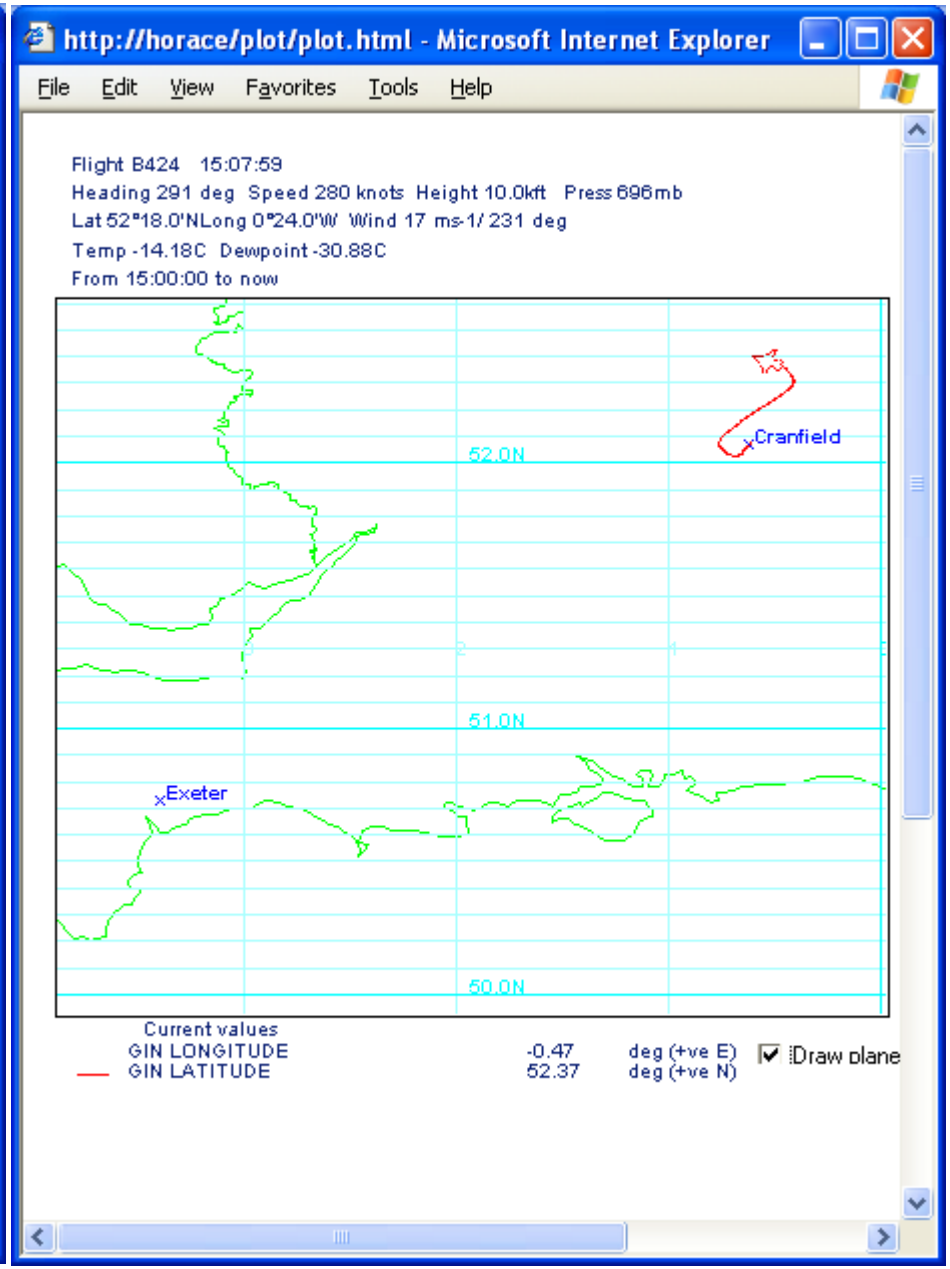
Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
CH 19.26.31	RIGent/P15	FL80	243	51°6'/1°24'	Ore Anil [-5.7°C/-4.89 752mb]
					good mix - small drops - large N° large (CPI)
					(some columns)
19.29.09	PISE/R15	FL60	248	51°0'/1°36'	[-3.07/-2.55°, 810mb]
					Ore Anil :- Water drops - range sizes 2DC/PIP
					(250 l⁻¹) 1/0.04 cm³
					PIP 200μm - narrow mode.
					CPI - drops - sticking together 2DS 200μm
					(100 & 300μm)
					FSSP: 2cm⁻³ mode 15-20μ
					+ bottom domed mode !!
					CDP: ones not high enough - can't see
19.38.00	ish				* lost total water Nevzorov — again !!!
19.40.51	RISend/P16	FL60	248	50°54/2°30'	[-1.29°C/0.5°C, 811 mb]
19.42.51	PIbeg/R16	FL40	242	50°54/2°42'	[-0.65/1.81°C, 873mb] melting ice
					(CPI) - occasional large blobby things — turbulence here.
19.47.26	R16	FL40	84	50°54/2°18'	[+0.79°/1.54°C, 874mb]
19.48.48	R16	FL40	82	50°54'/2°12'	Turbulence [+0.07°C/+1.1°C, 874mb]
19.51.55	R16	FL40	84	51°0'/1°54'	More turbulence [-0.67°C/0.89, 874mb]
19.52.36	R16	FL40	83	51°0'/1°48'	Seeing lots of ice now [-0.43/0.66, 874mb]
CH 19.56.51	R16	FL40	79	51°6'/1°24'	[874mb, -0.52°/0.1°C] Over Anil bottom
19.57.34	R16end/P17	FL40	347	51°6'/1°24'	[873mb -0.46°/0.19°C] not allowed to PEGIS but climbing
19.58.40	PITend/R17	FL50	91	51°12'/1°18'	[842mb -2.15°/-1.20°C]
CH 20.01.33	R17 Sta	FL50	236	51°6'/1°24'	Ore Anil bottom [843mb, -1.57°/1.28°]

Mission Scientist's Log

Flight No B.424 **Date** 21/01/09 **Name** K.N. BOWER **Page** 10 **of** 10

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
20.03.32	R12	FL50	239	51°6'/1°30'	[-1.46/-1.27 843mb (28m/s/199°)] Turb?
20.06.07	R17	FL50	260	51°0'/1°42'	[-1.2°C/0.29] 842mb (23/215°)] deleted?
20.09.46	R17	FL50	245	51°0/2°0'	[-0.13/0.13] 842mb (25m/s/206°)] ?
20.11.37	R17	FL50	245	50°54/2°12'	[-0.87/-0.1°C] 843mb (25m/s/205)] ?
20.11 52	R17	FL50	245	50°54/2°12'	[-0.98/0.06°C] 842mb (26m/s/206)] ?
20.12 16	R17	FL50	244	50°54/2°12'	[-1.08°/0.0] 842mb (26m/s/206)] ?
20.12 33	R17	FL50	244	50°54/2°12'	[-0.93°/10.13] 842mb (26m/s/205)] ?
20 19.48.	R12end	FL50			
					QNH 993
					Wind 170/16kts
					CB 650ft.
20 13.15	land				back - arrived (phew!)
CVI Taken again					
New Tot Water - check.					
PMMS N Working					
Turbulence probes - recal					
Cloud Phys - OK					
Nav Cloud - OK.					





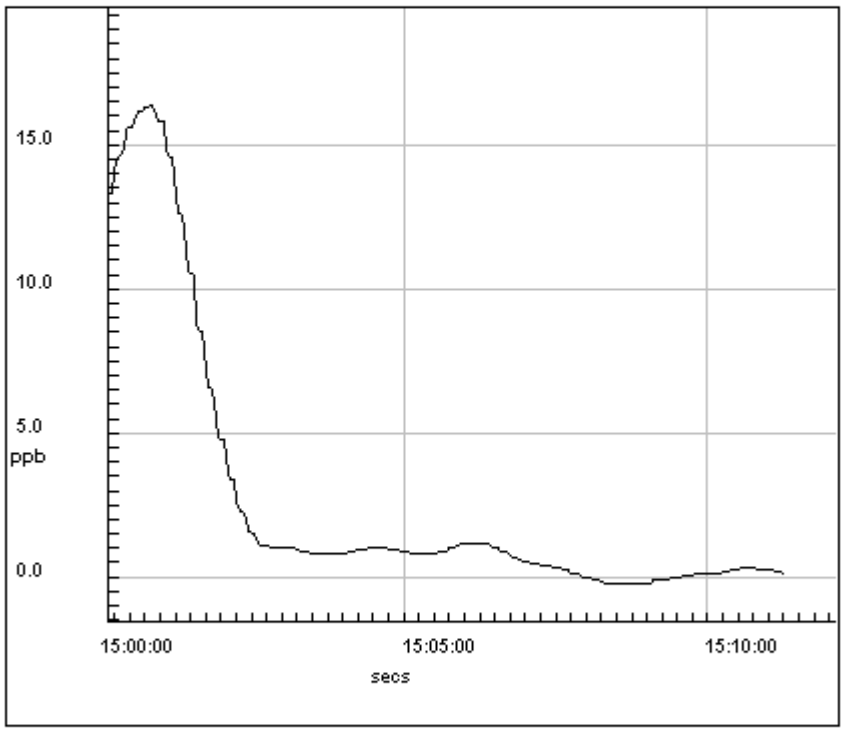
Arrived FL100 for transit

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

New plot, same times

Flight B424 15:11:20
Heading 242 deg Speed 264 knots Height 10.0kft Press 696mb
Lat 52°12.0'N Long 0°48.0'W Wind 13 ms-1/ 225 deg
Temp -13.96C Dewpoint -26.52C
From 15:00:00 to now



Current values

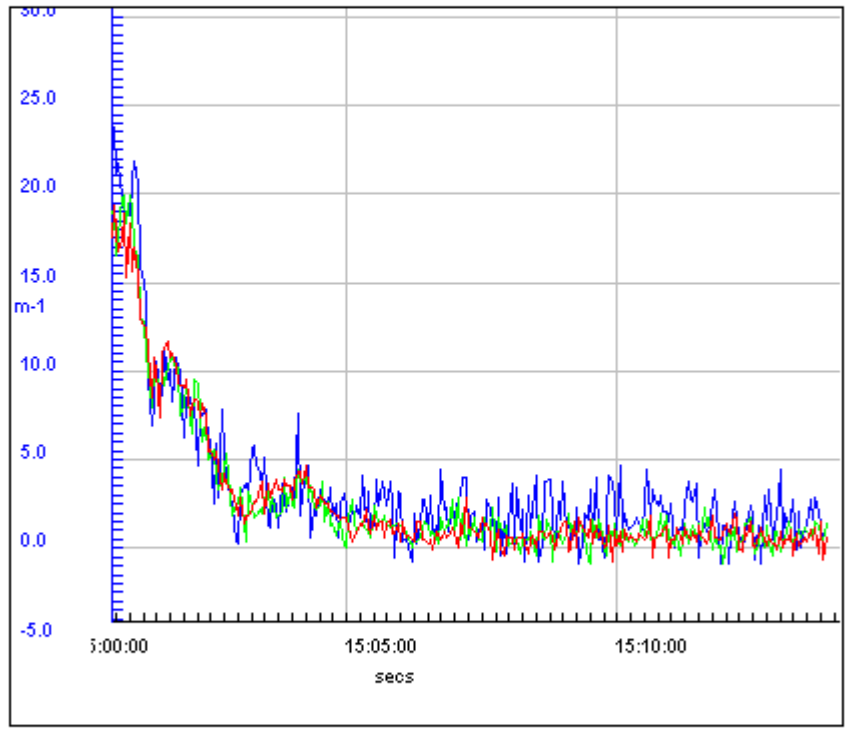
TIME FROM MIDNIGHT	54678	secs	All	sc
TECO NOx	0.15	ppb		

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

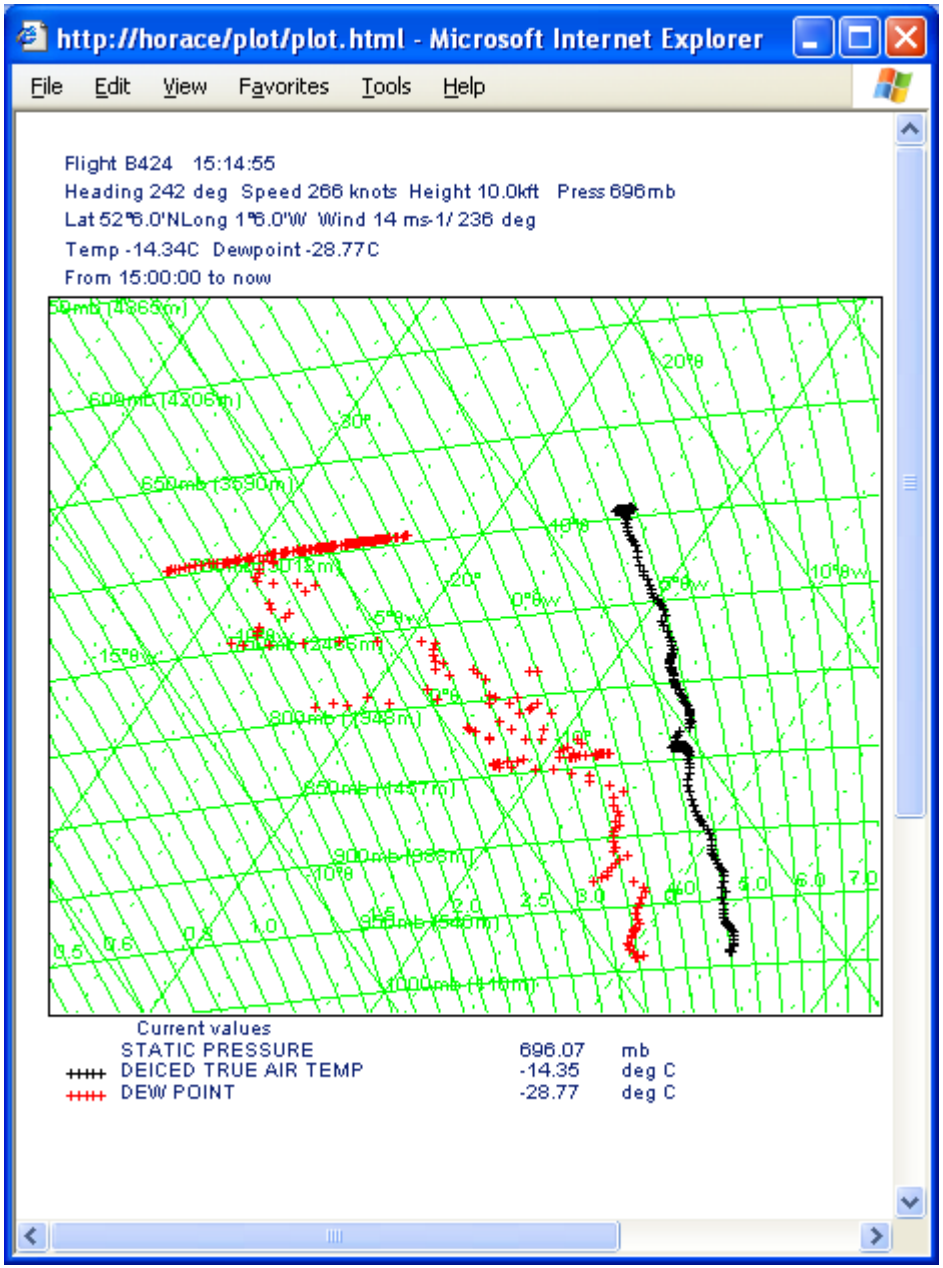
New plot, same times

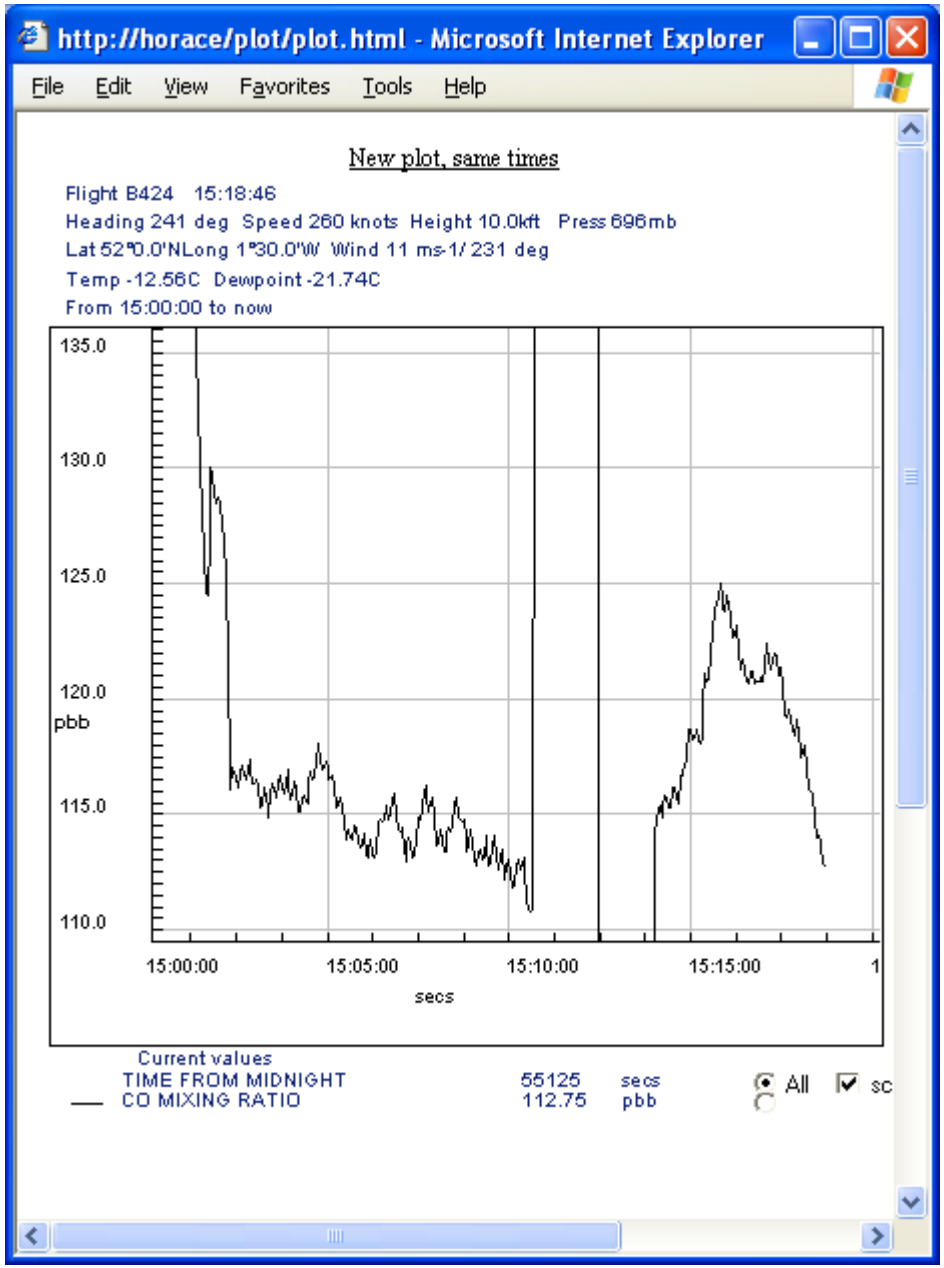
Flight B424 15:13:53
Heading 242 deg Speed 263 knots Height 10.0kft Press 696mb
Lat 52°12.0'N Long 1°0.0'W Wind 14 ms-1/ 235 deg
Temp -14.65C Dewpoint -26.31C
From 15:00:00 to now



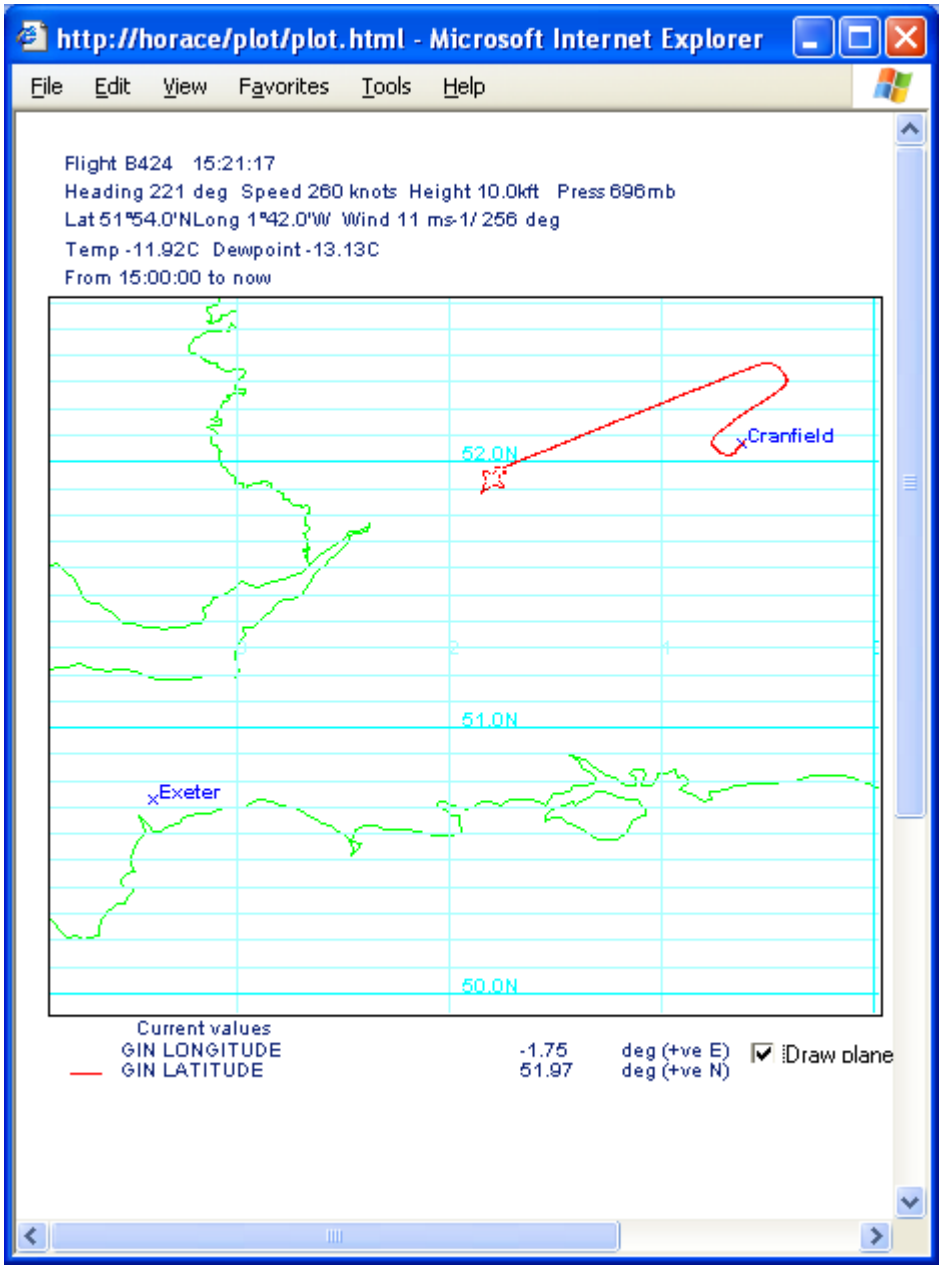
Current values

TIME FROM MIDNIGHT	54831	secs	All	sc
NEPH BLUE SP	1.25	m-1		
NEPH GREEN SP	1.42	m-1		
NEPH RED SP	0.59	m-1		

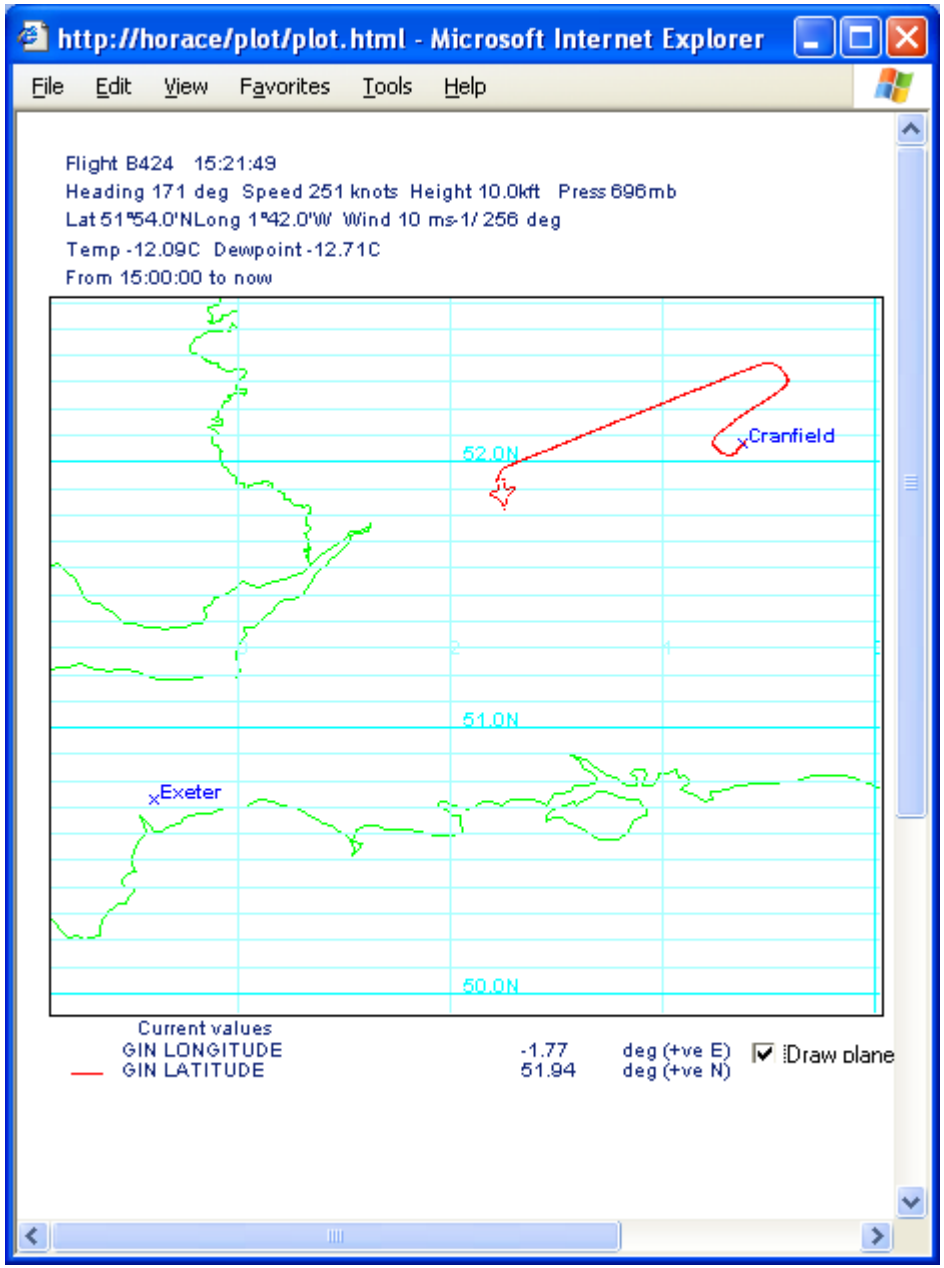




Transit FL100



Turn to start profile



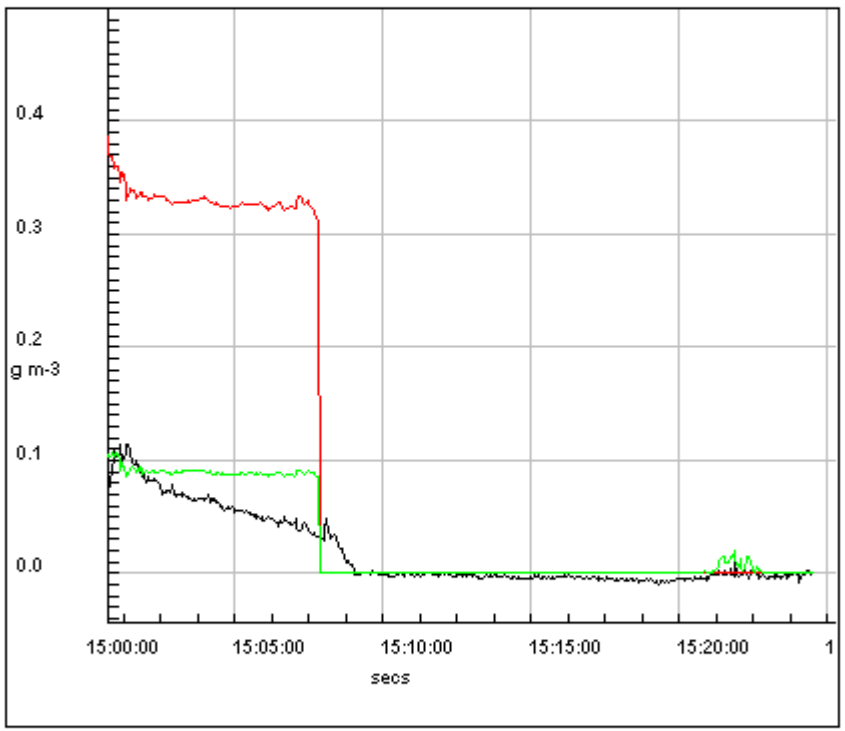
Start P1

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

New plot, same times

Flight B424 15:24:35
Heading 172 deg Speed 244 knots Height 7.4kft Press 769mb
Lat 51°42.0'N Long 1°36.0'W Wind 14 ms-1/ 236 deg
Temp -8.12C Dewpoint -10.53C
From 15:00:00 to now



Current values

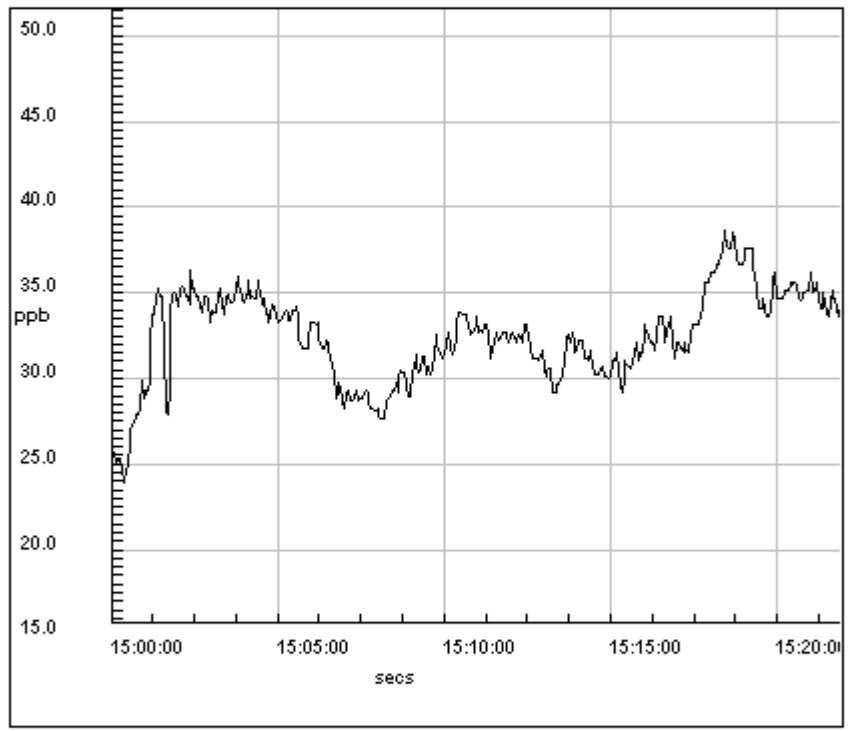
	TIME FROM MIDNIGHT	55473	secs	All sc
—	JW LIQUID WATER CONTENT	0	g m-3	
—	NEVZOROV LIQUID WATER	0	g m-3	
—	NEVZOROV TOTAL WATER	0	g m-3	

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

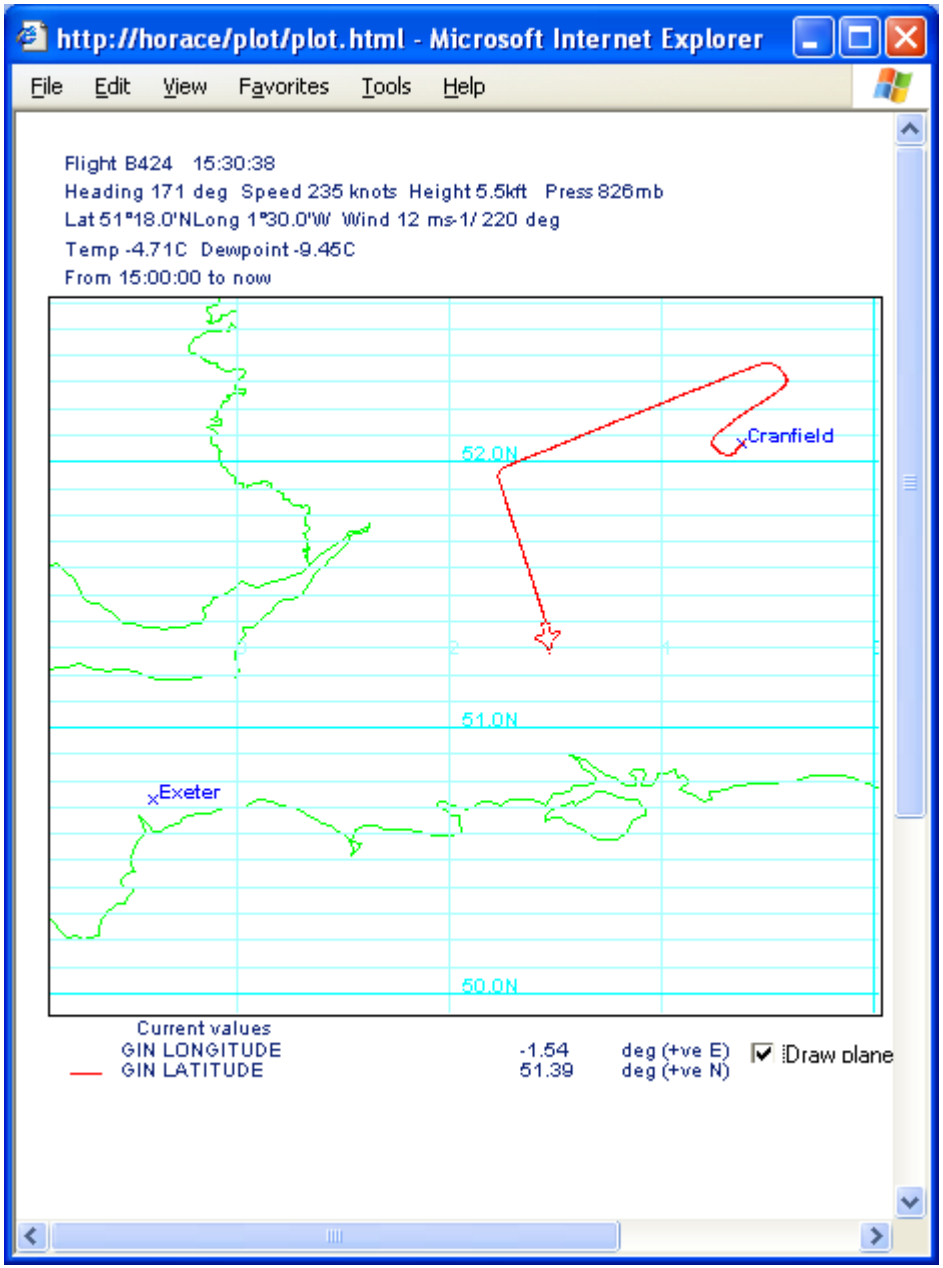
New plot, same times

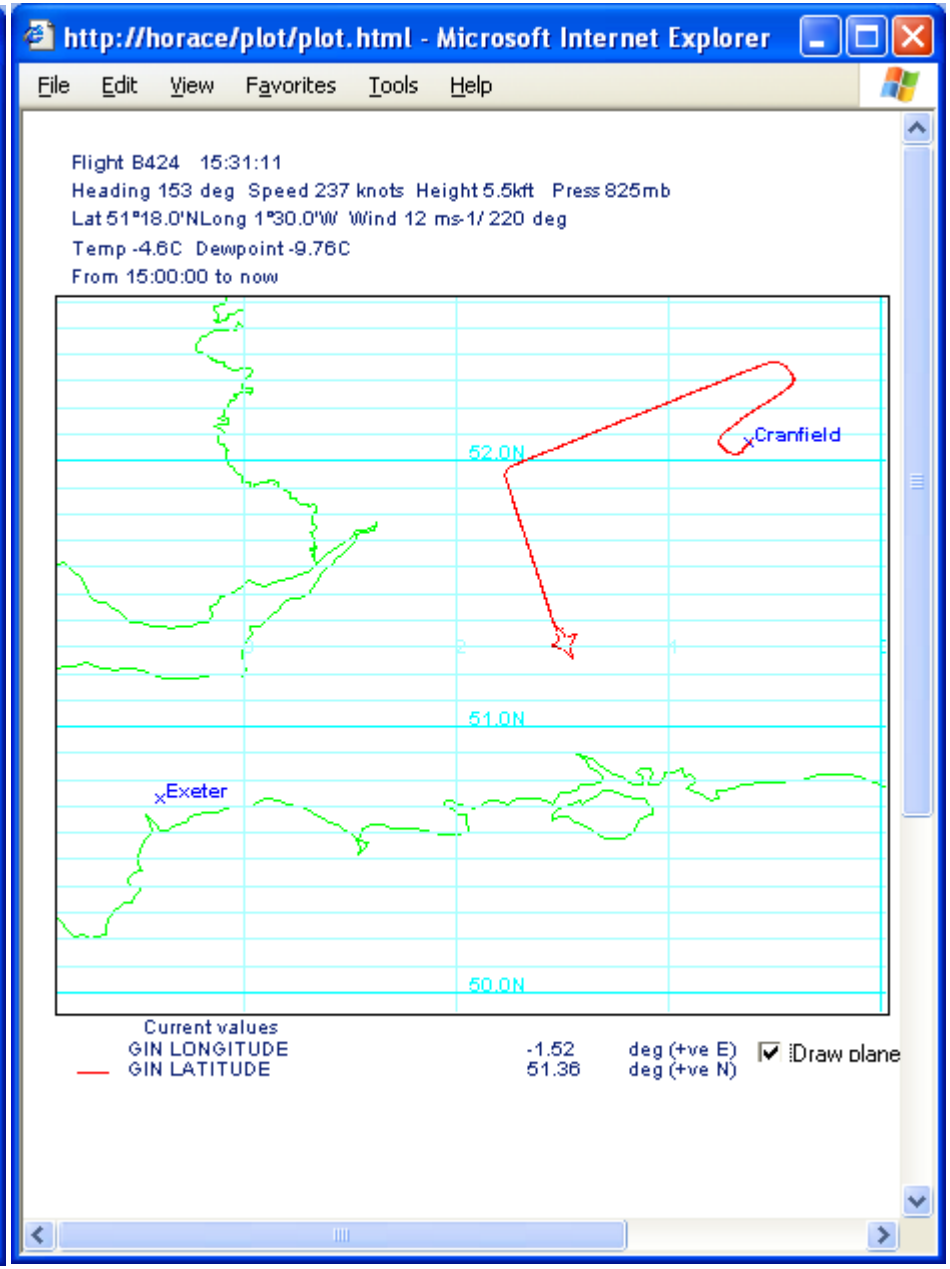
Flight B424 15:25:37
Heading 172 deg Speed 238 knots Height 6.0kft Press 810mb
Lat 51°36.0'N Long 1°36.0'W Wind 14 ms-1/ 230 deg
Temp -5.88C Dewpoint -9.06C
From 15:00:00 to now



Current values

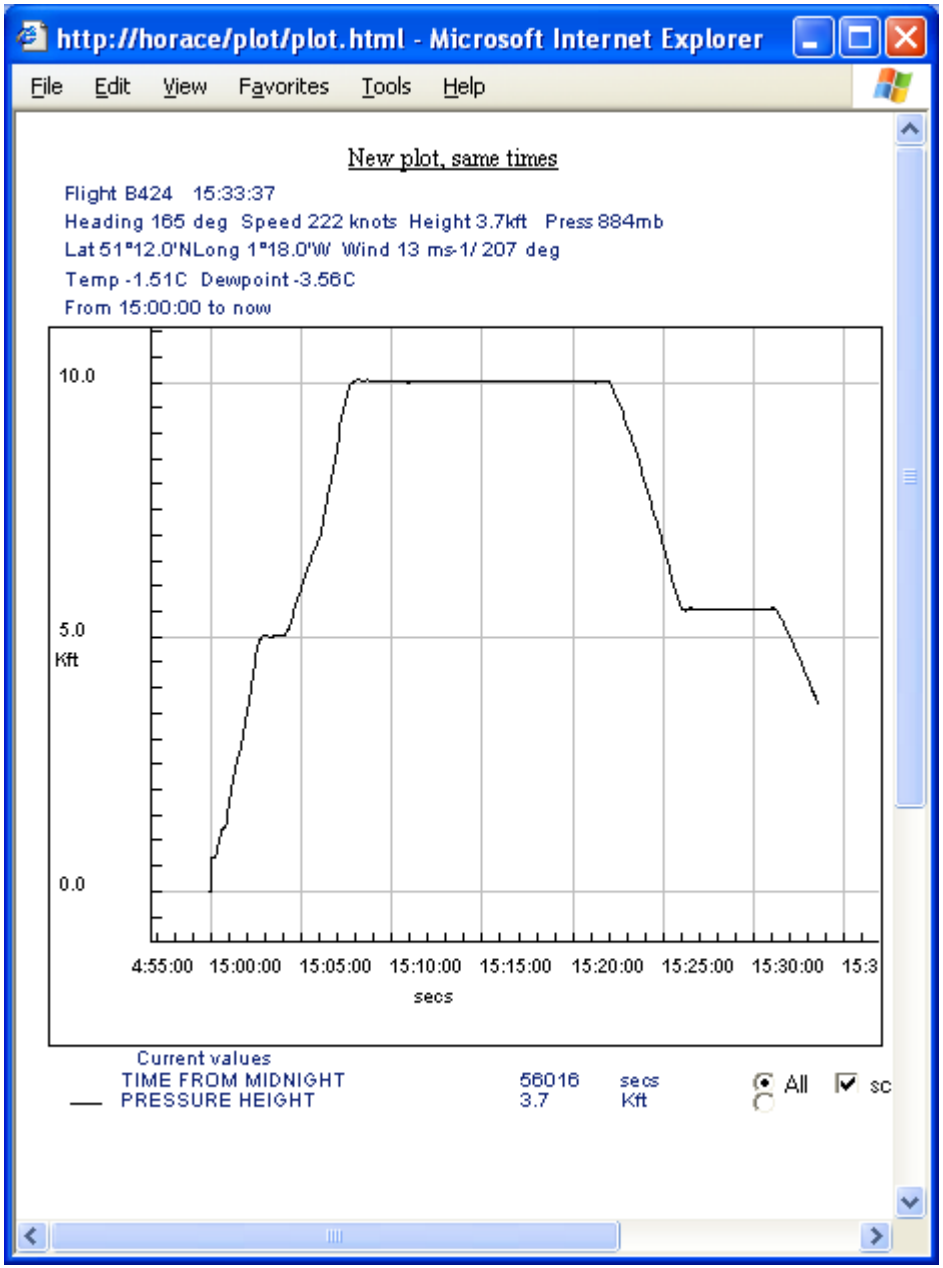
	TIME FROM MIDNIGHT	55536	secs	All sc
—	OZONE MIXING RATIO	31.19	ppb	

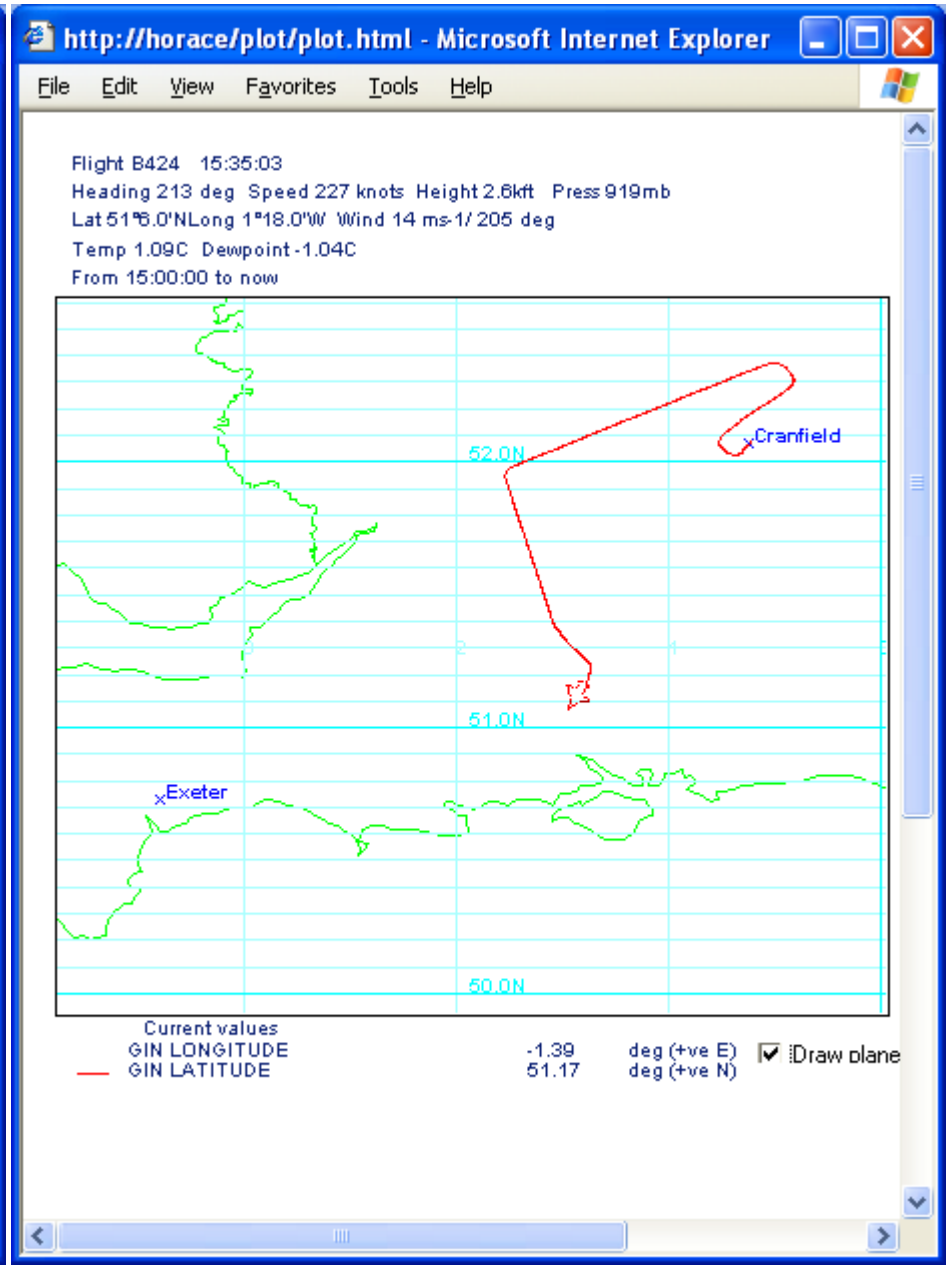




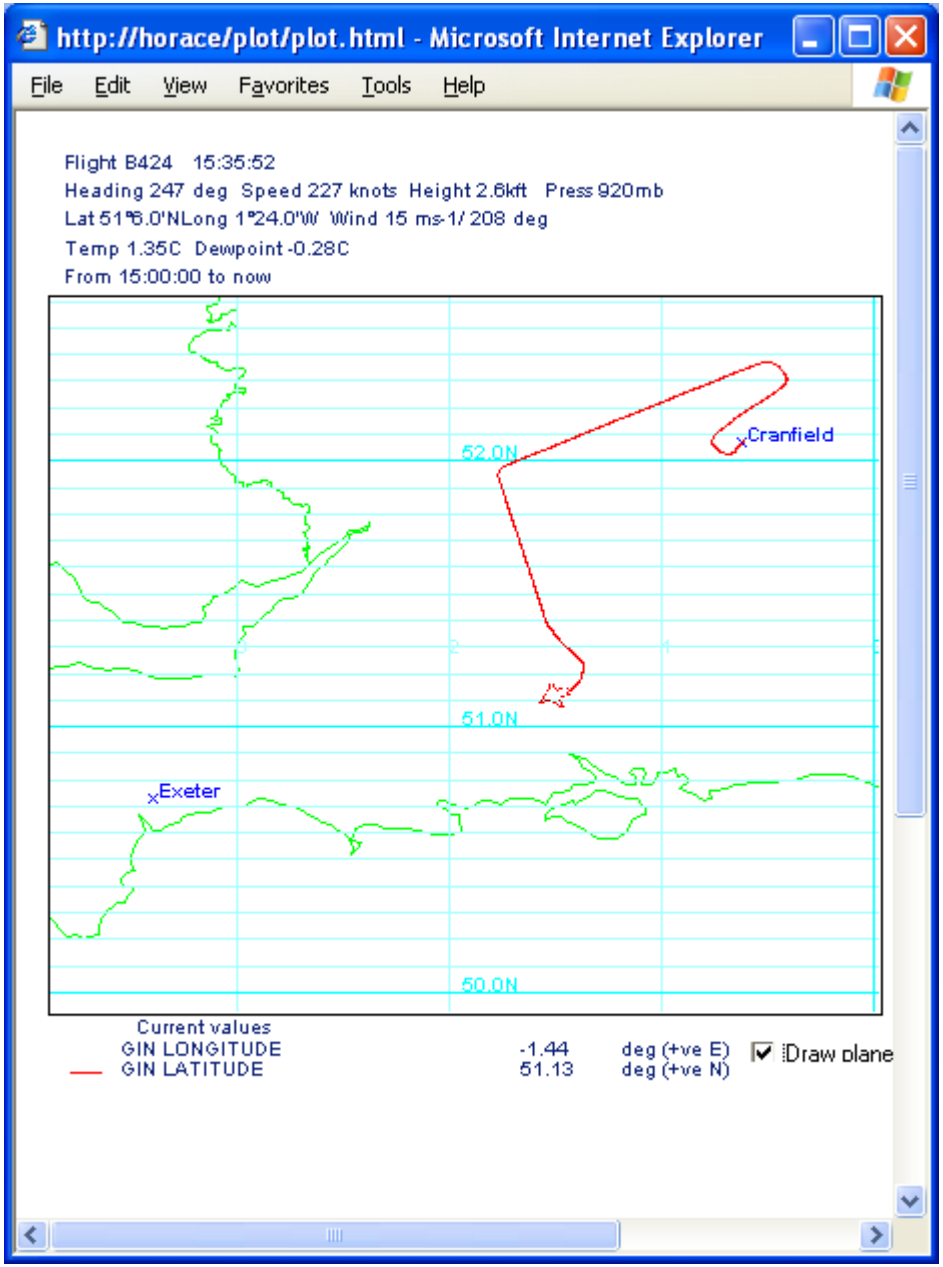
turn

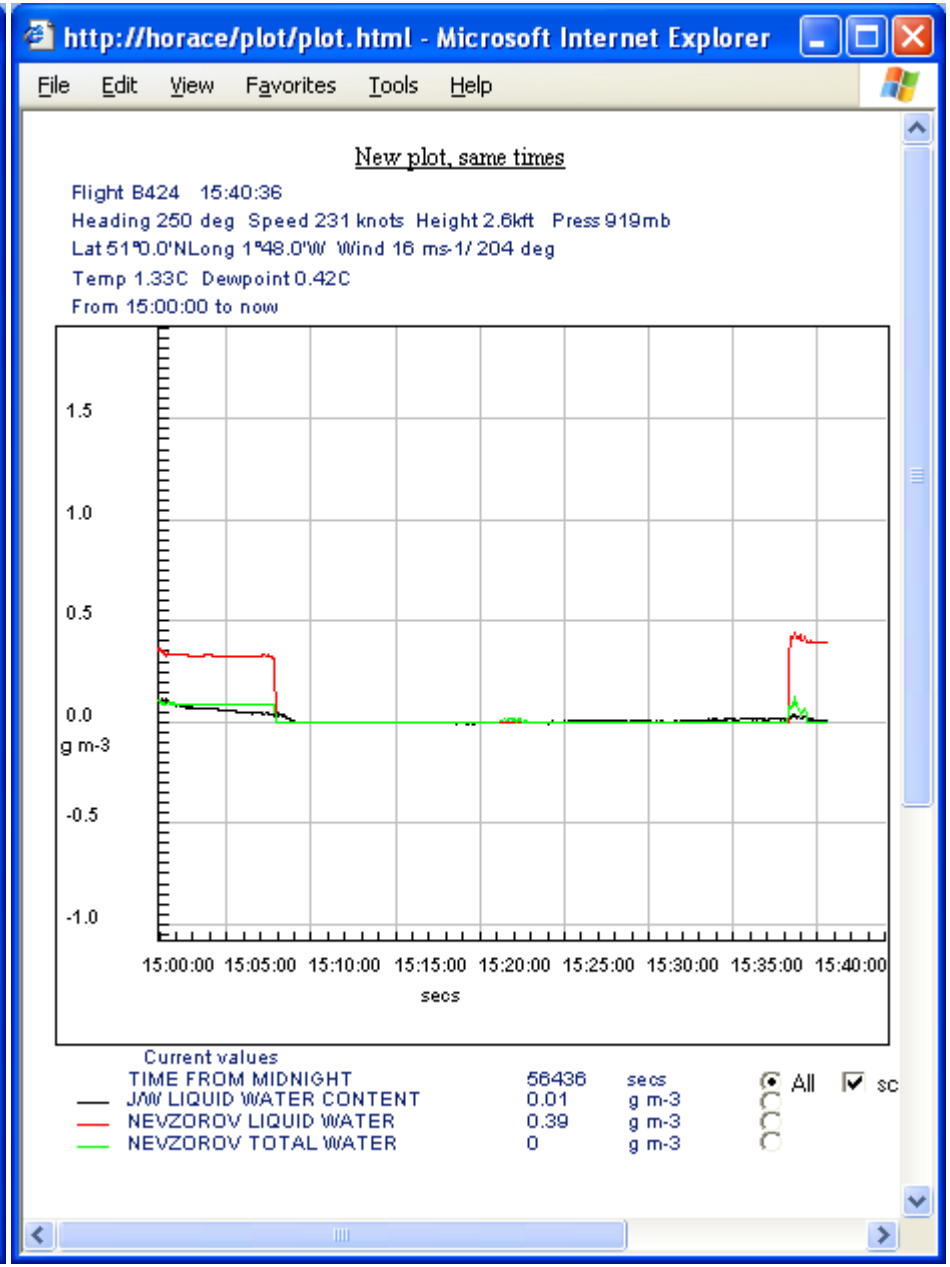
P2 start from 5.4kft to 2.3kft





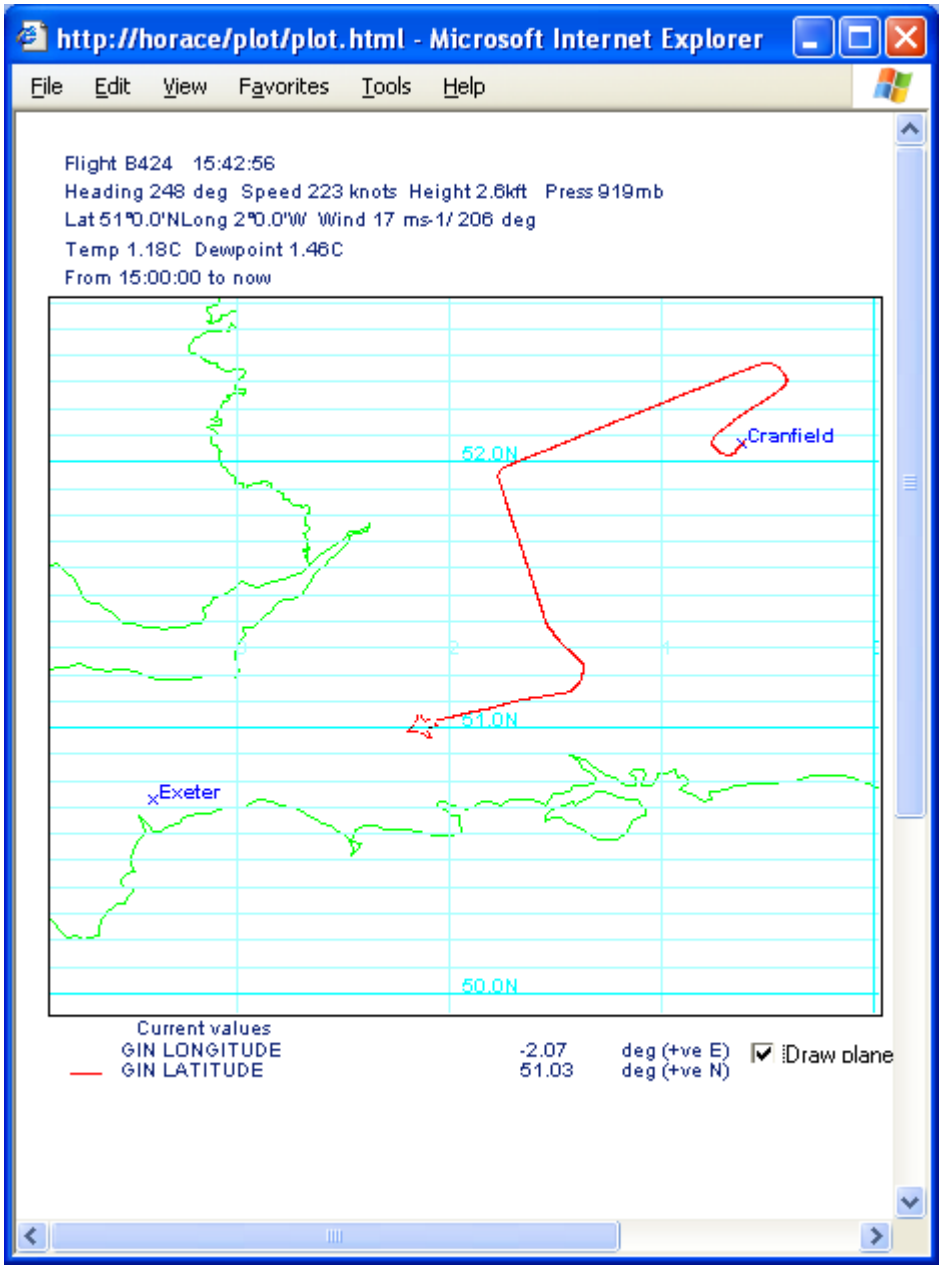
P2 end start R1

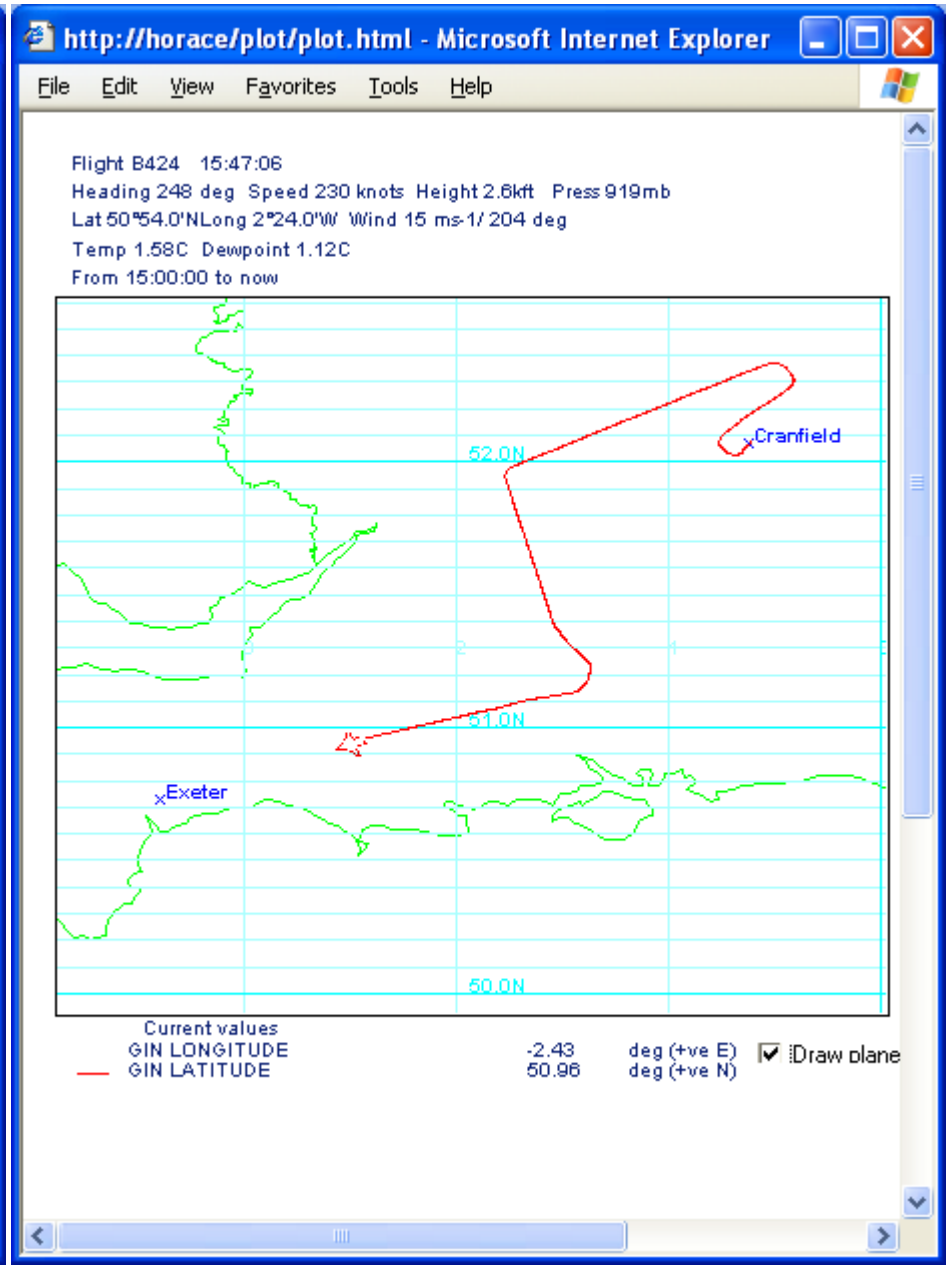




Just after Chilbolton (2s)

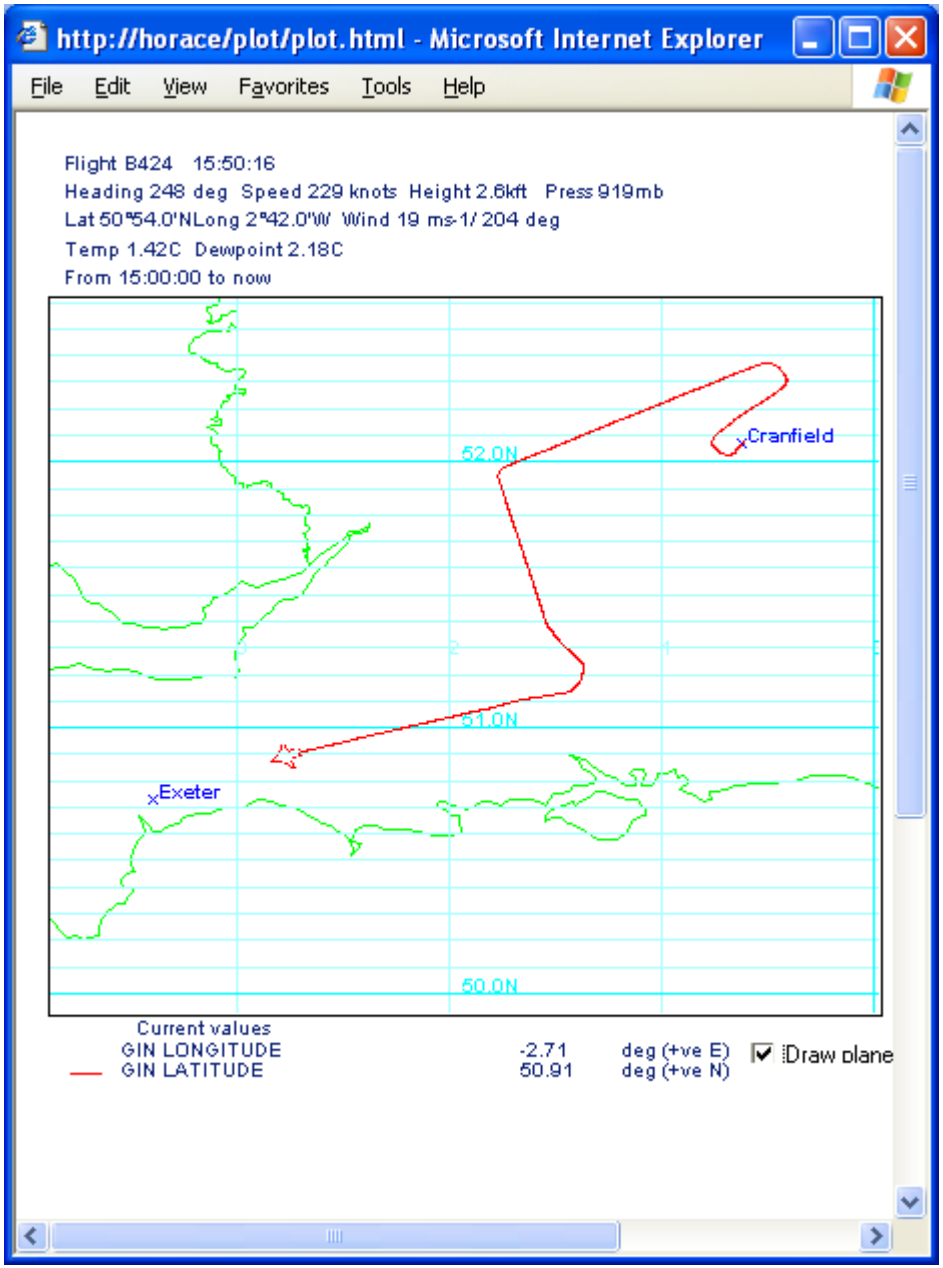
R1 2300ft just below CD



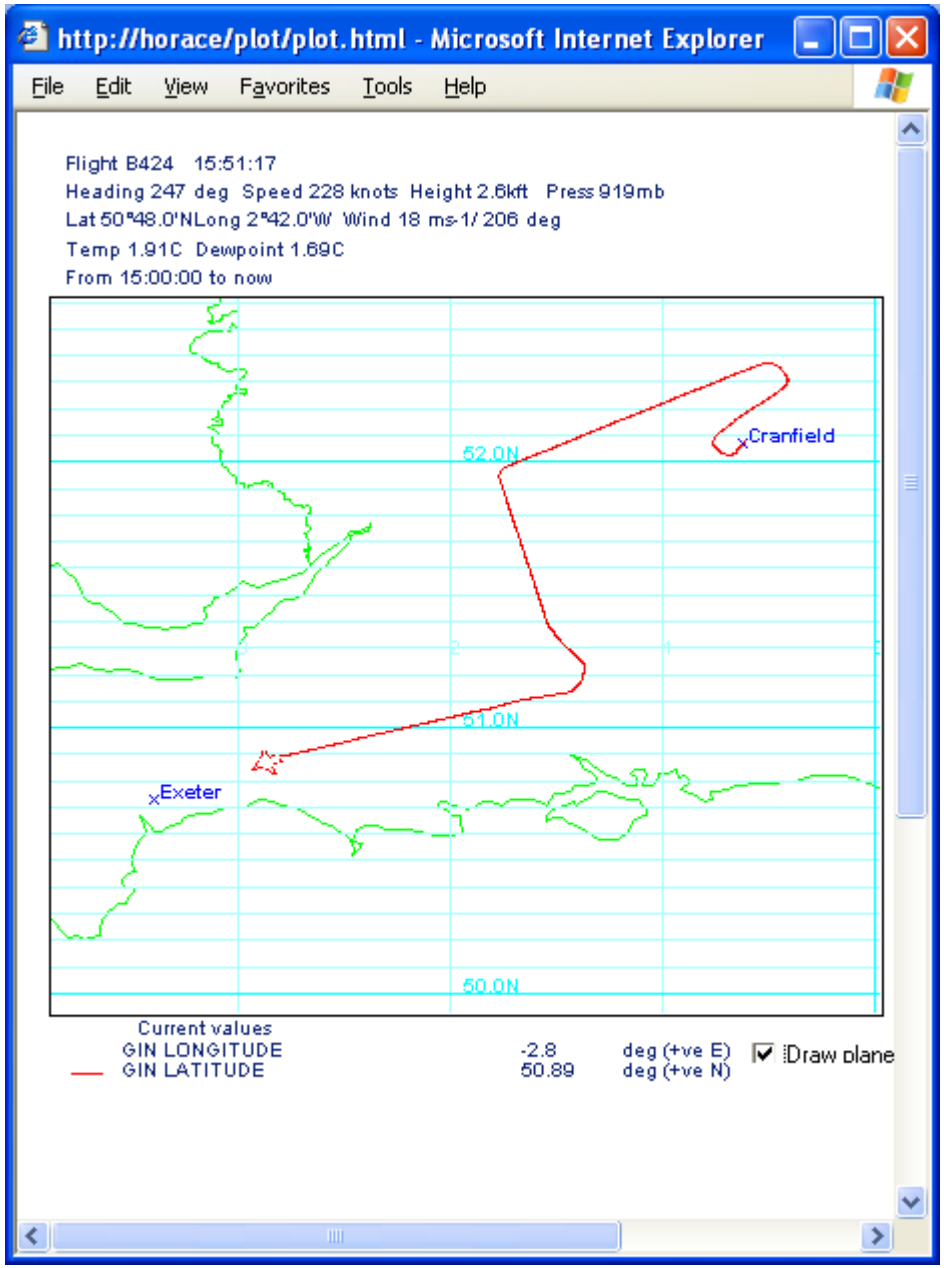


R1 Cloud and ppt filters off

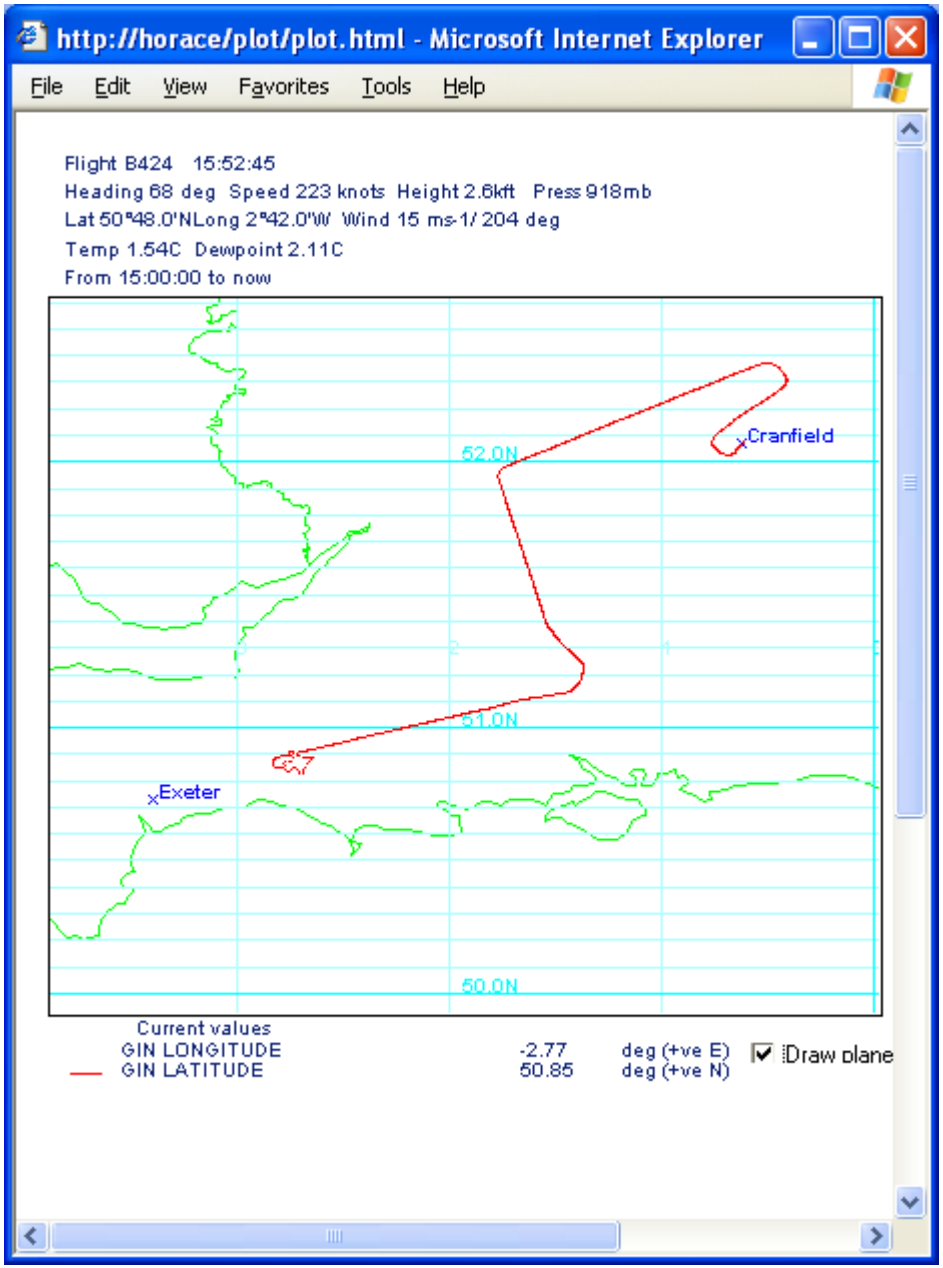
Ppt again



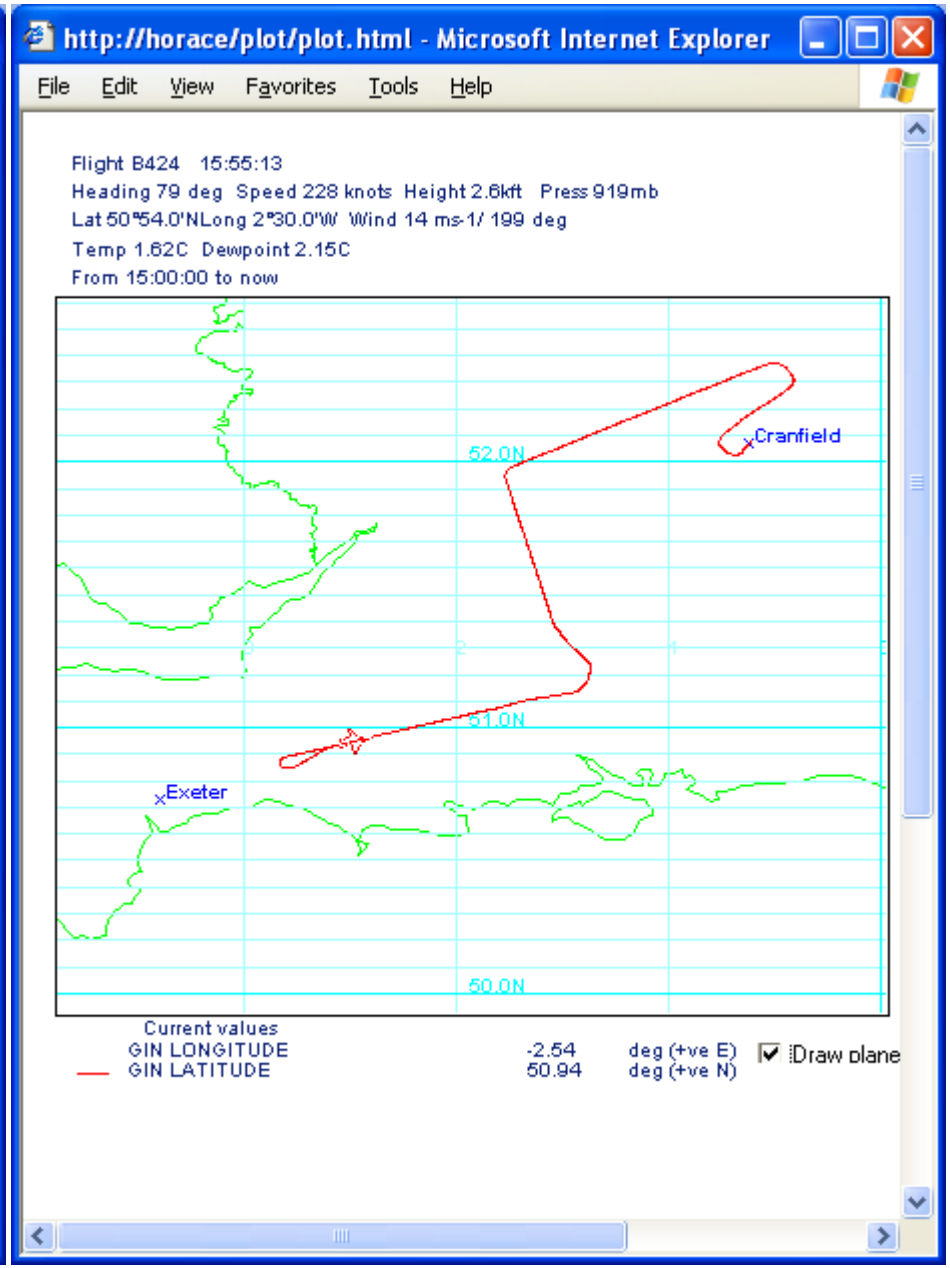
R1 into cloud now



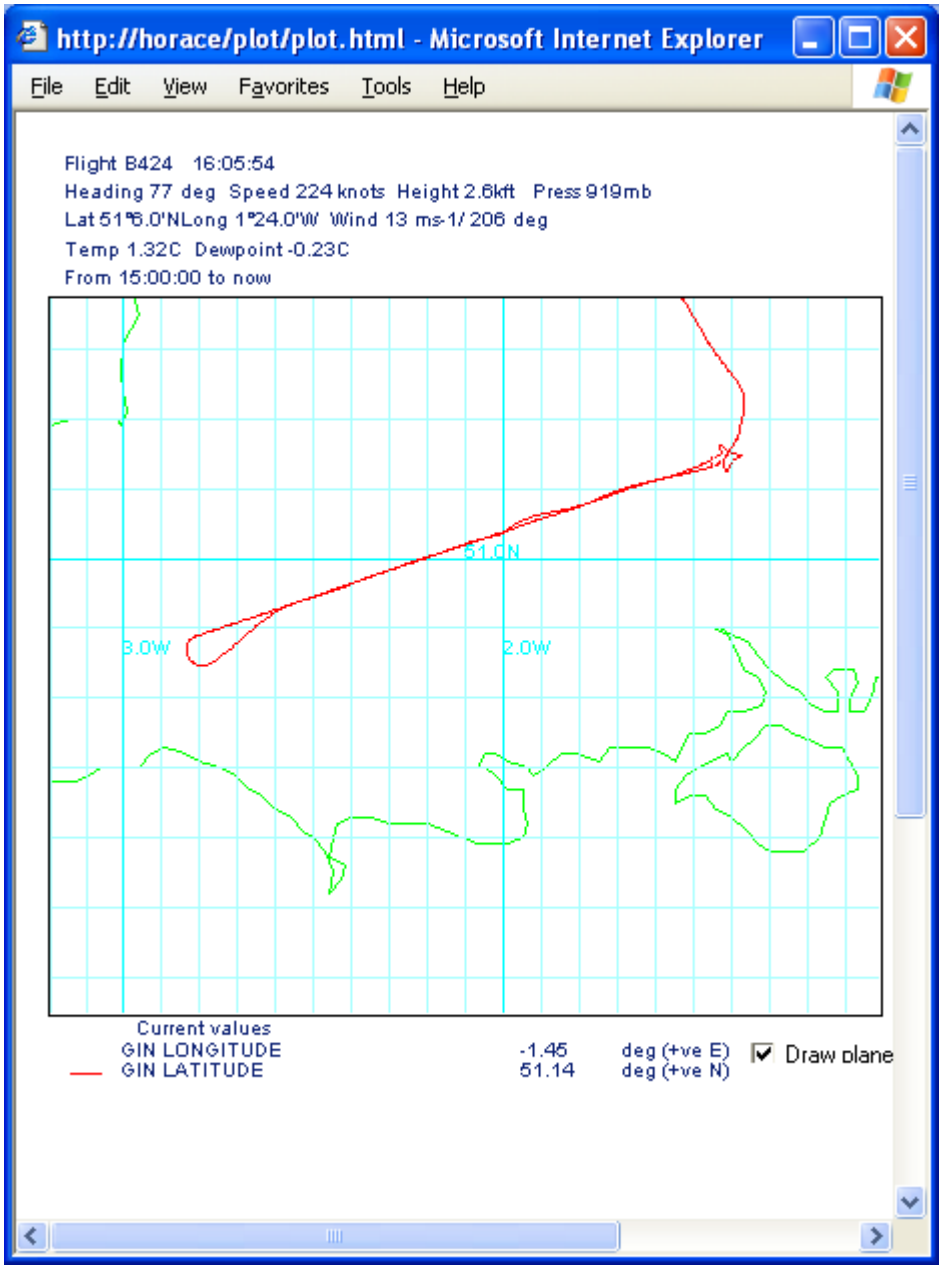
End R1

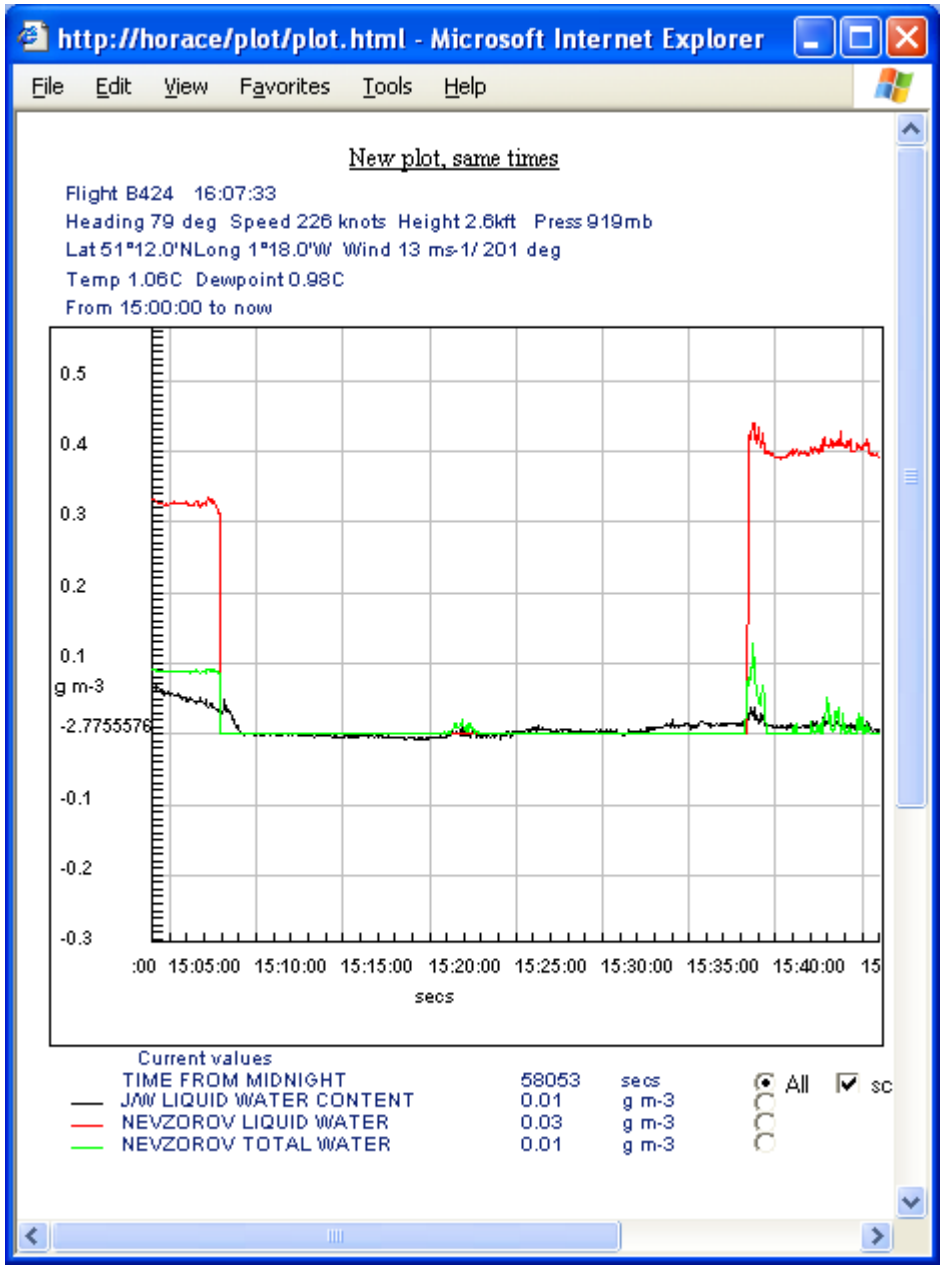


Start R2

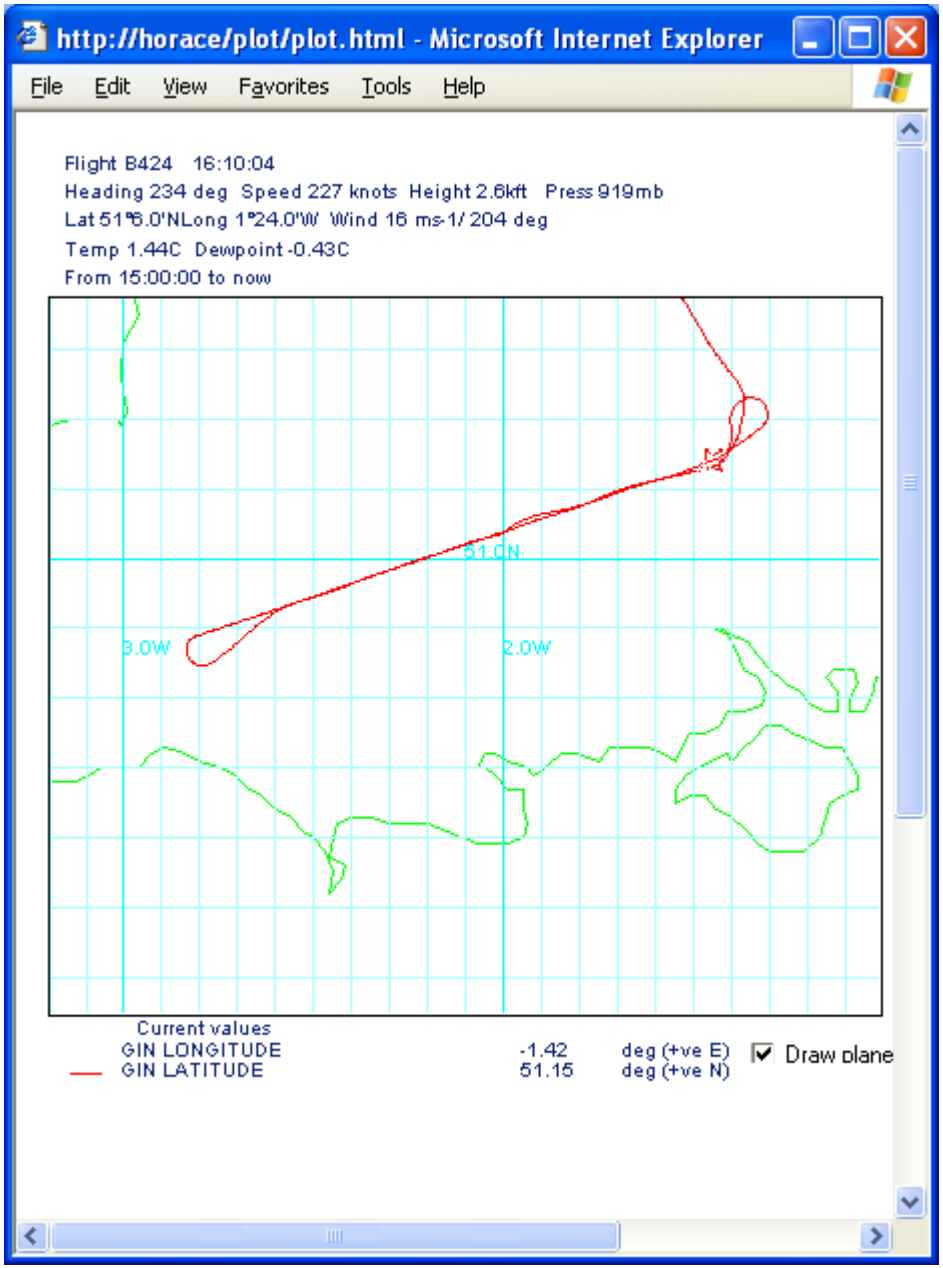


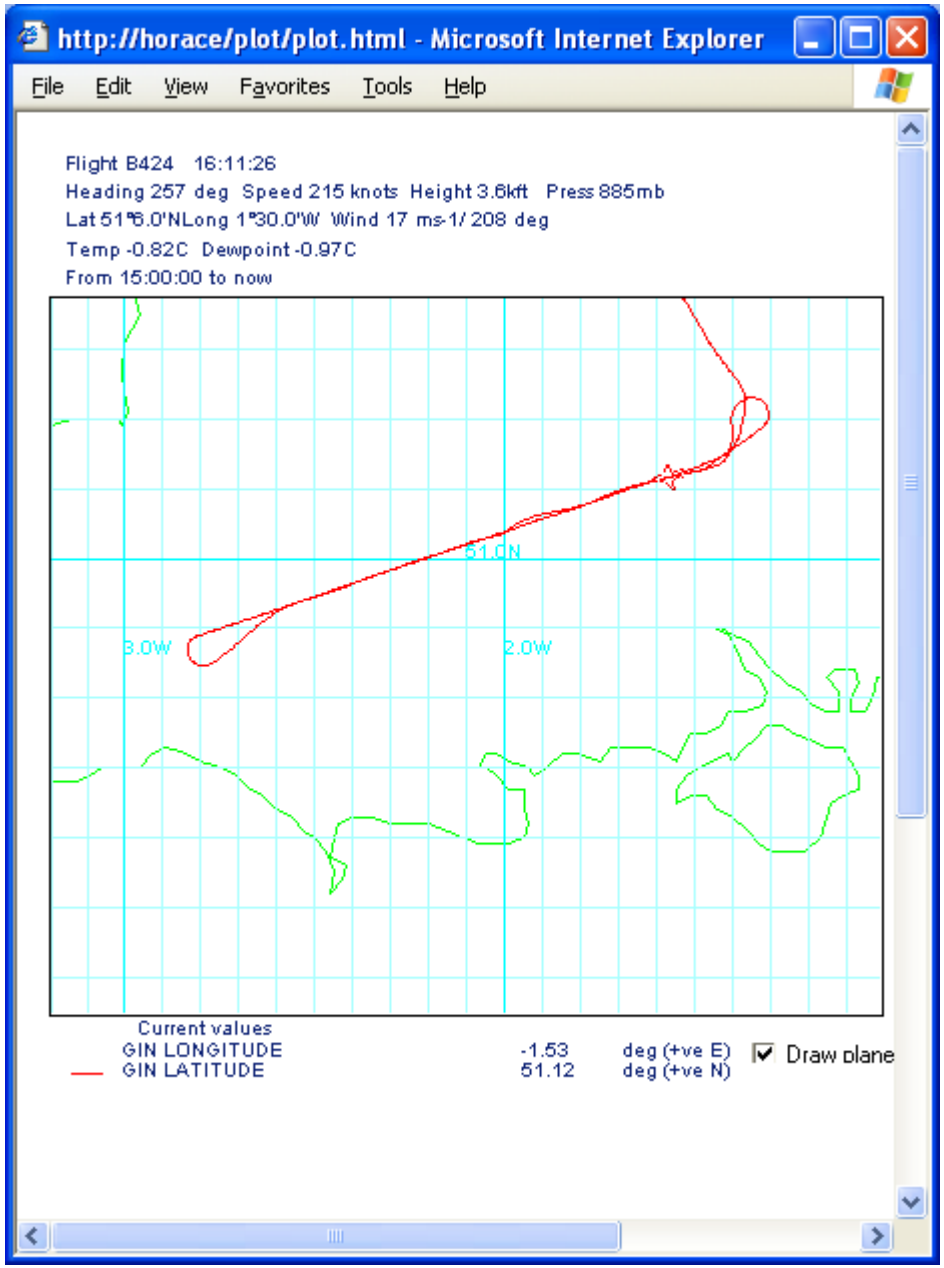
Free of cloud base but ppt





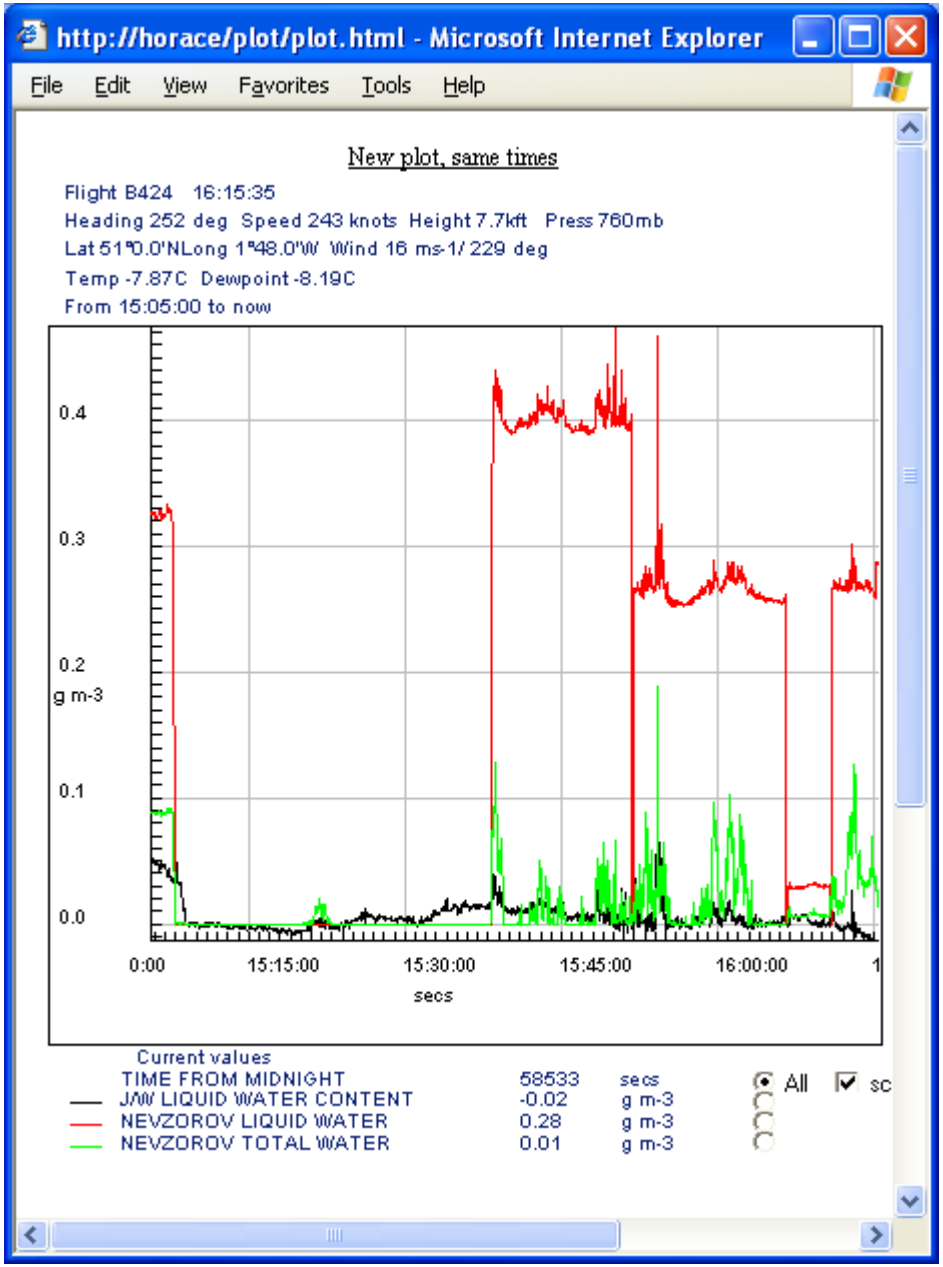
Overhead Chilbolton end R2

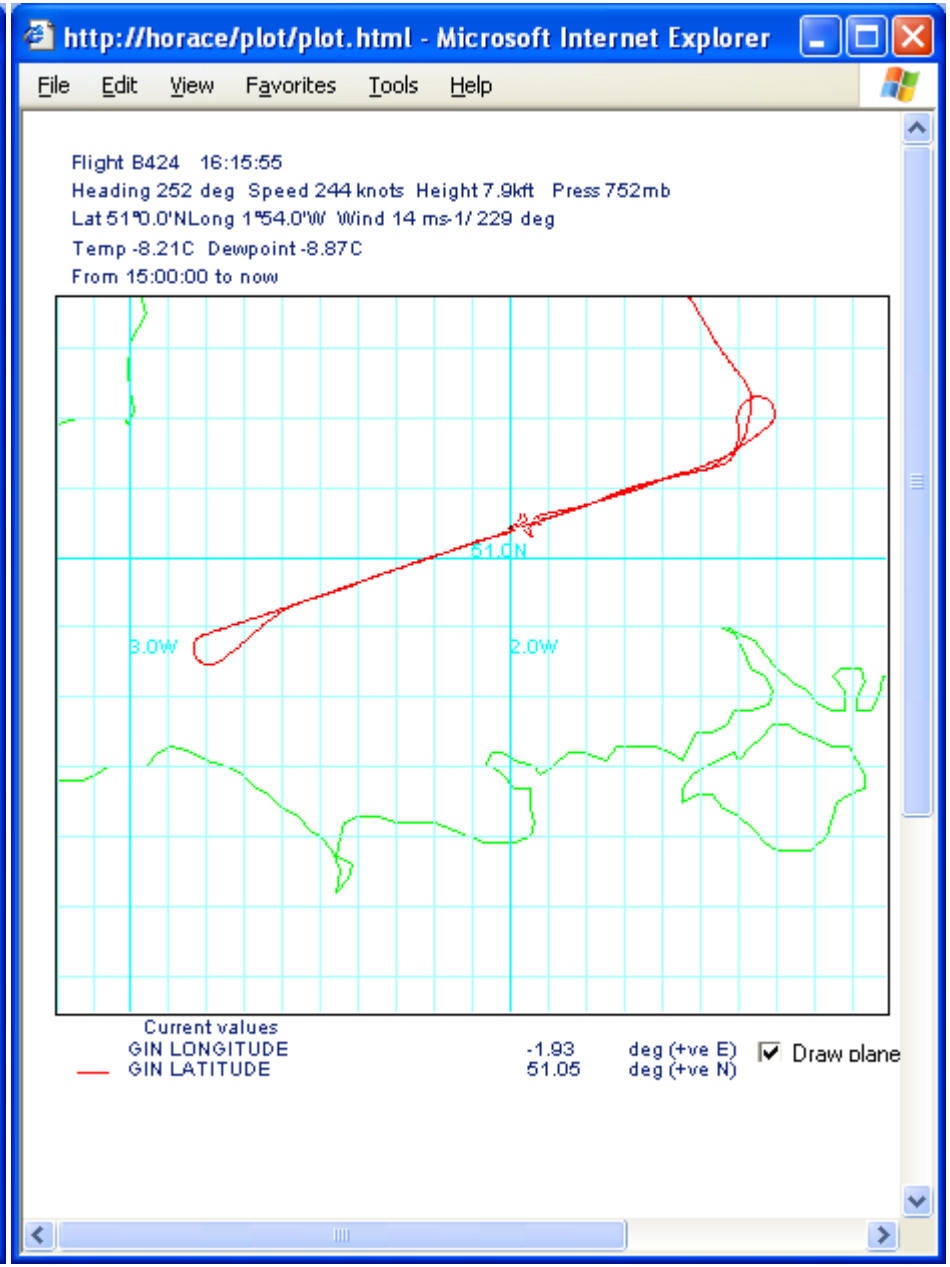




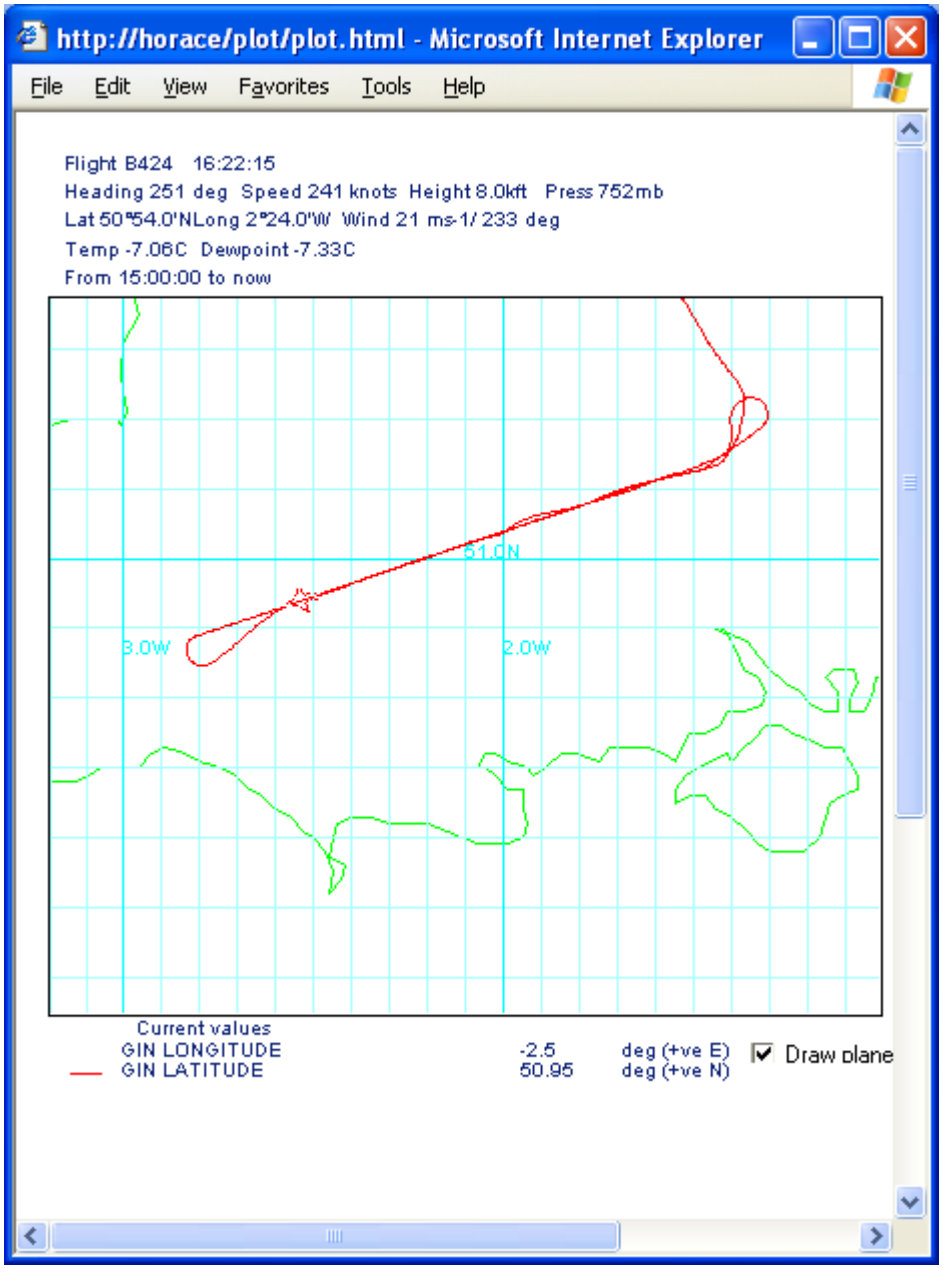
Overhead Chilbolton - start P3

P3 - at diffuse CB

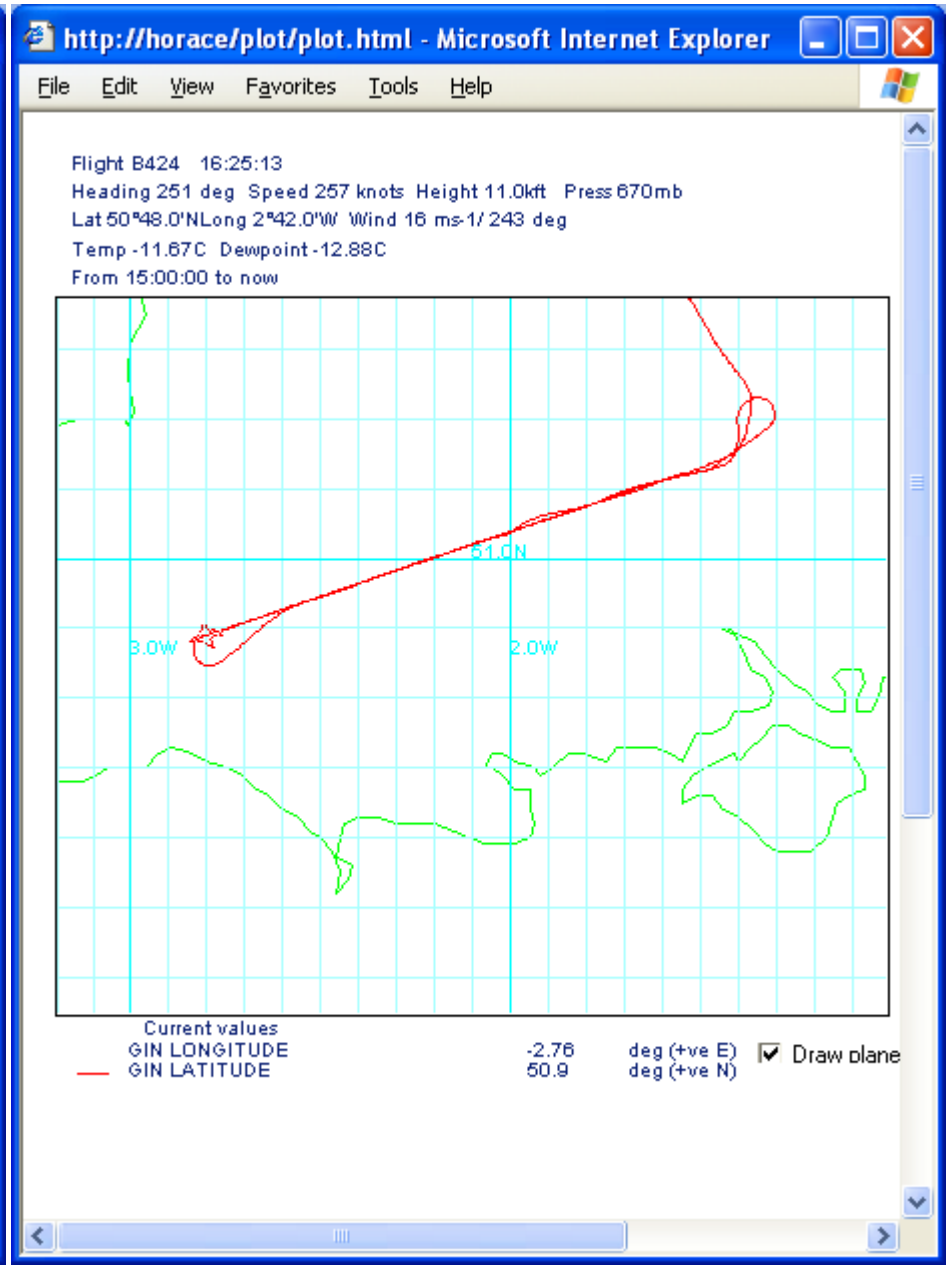




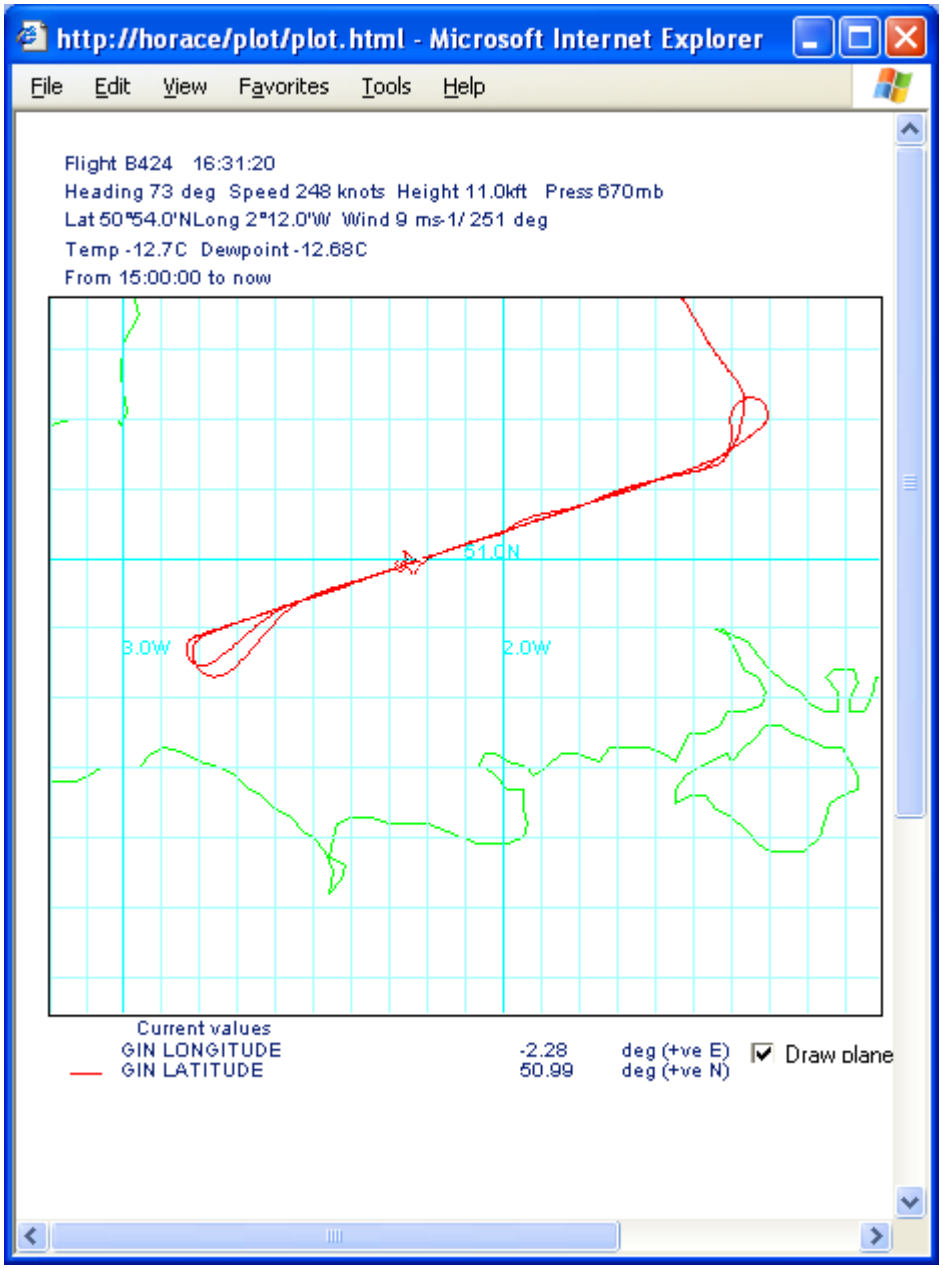
End P3 start R3 FL80

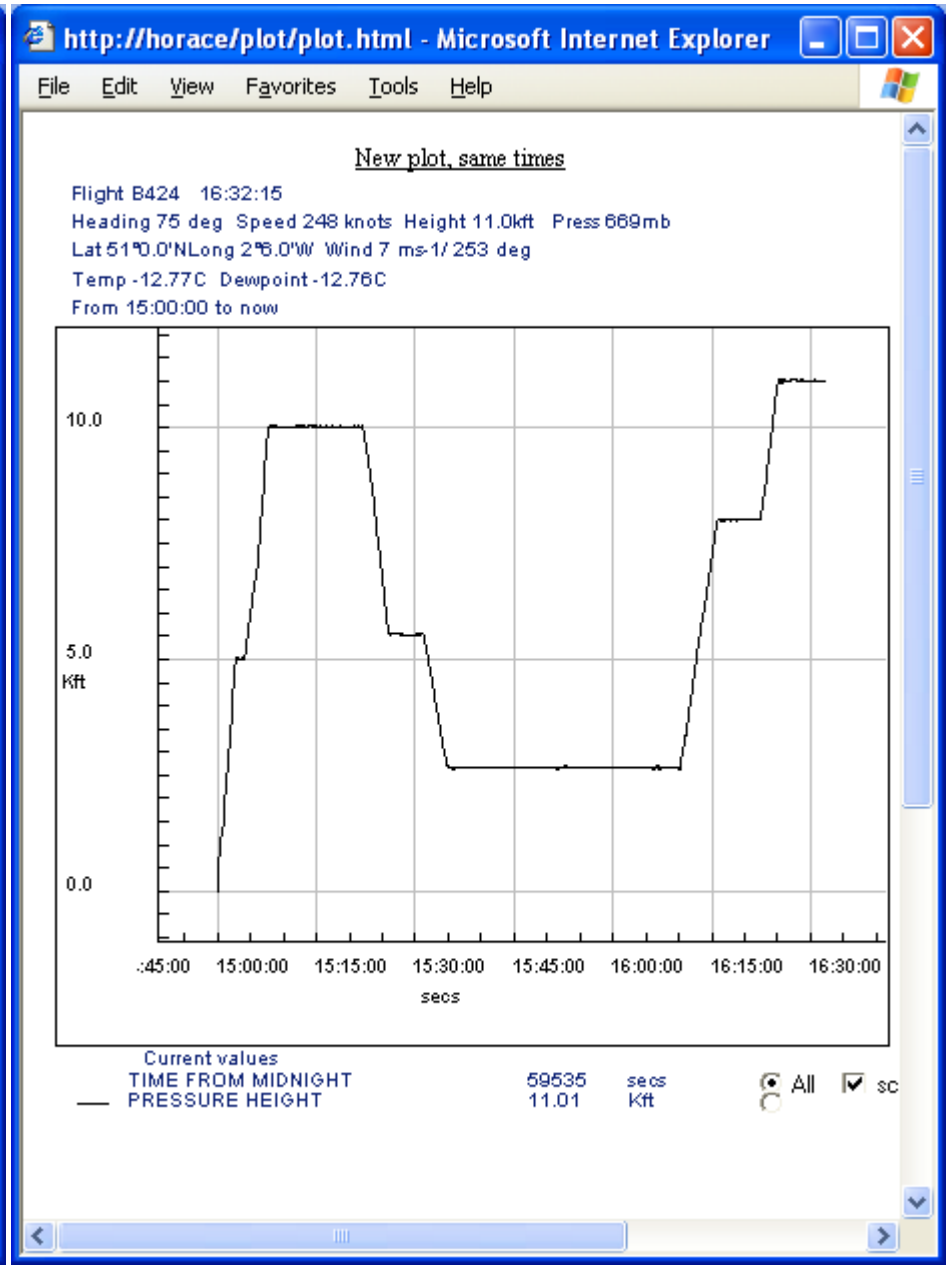


End R3, P4 start

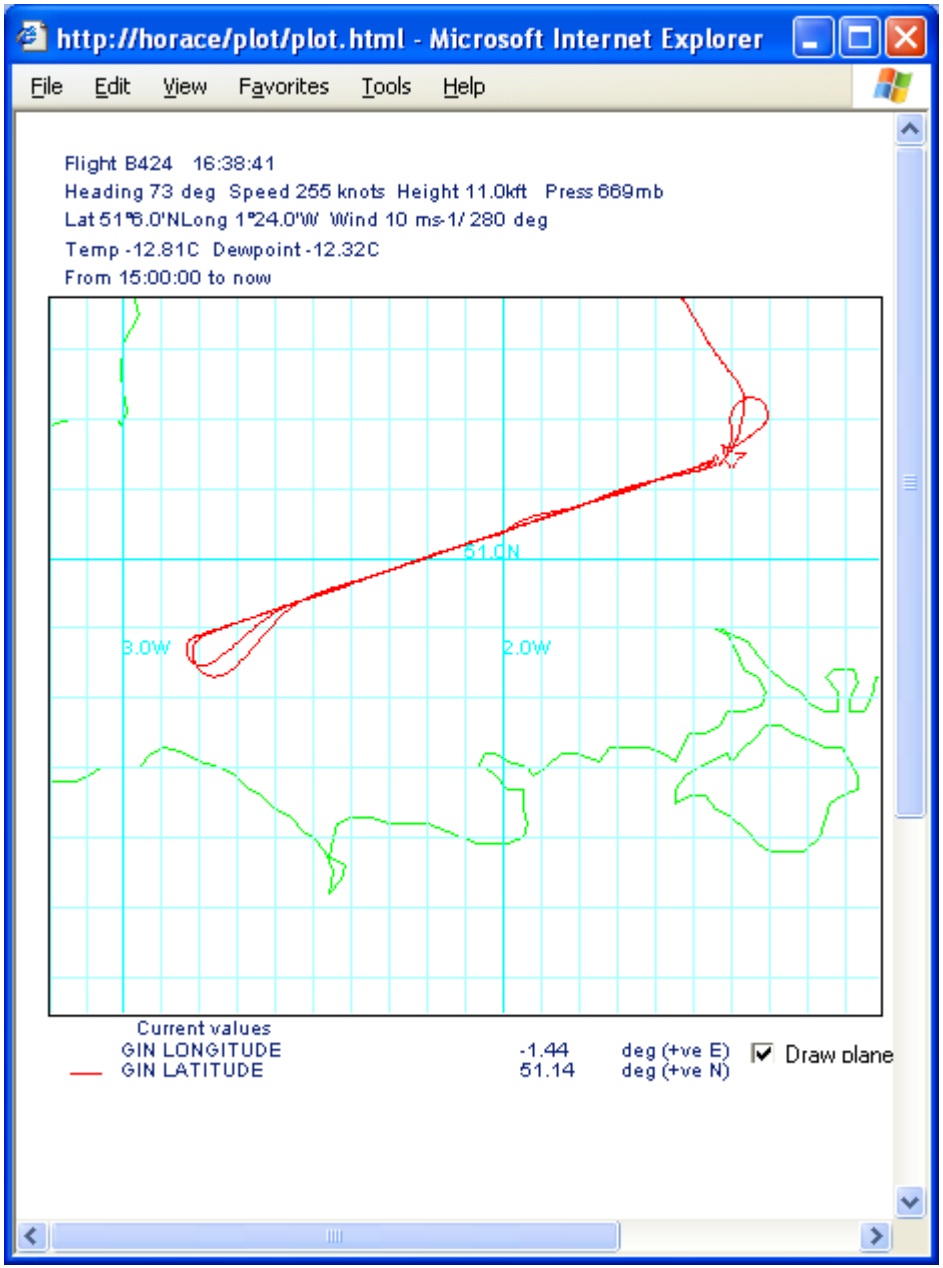


End P4 start R4

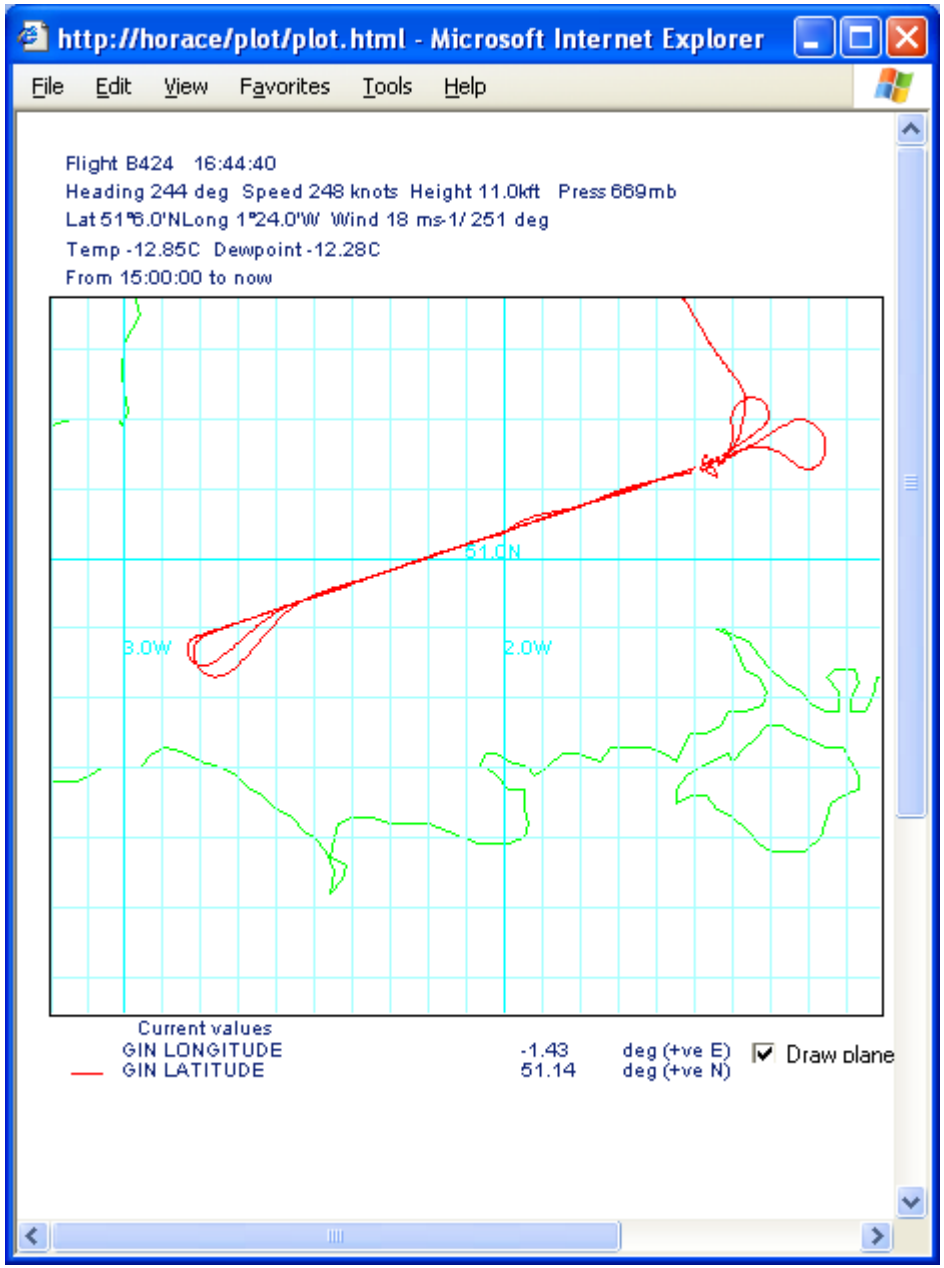




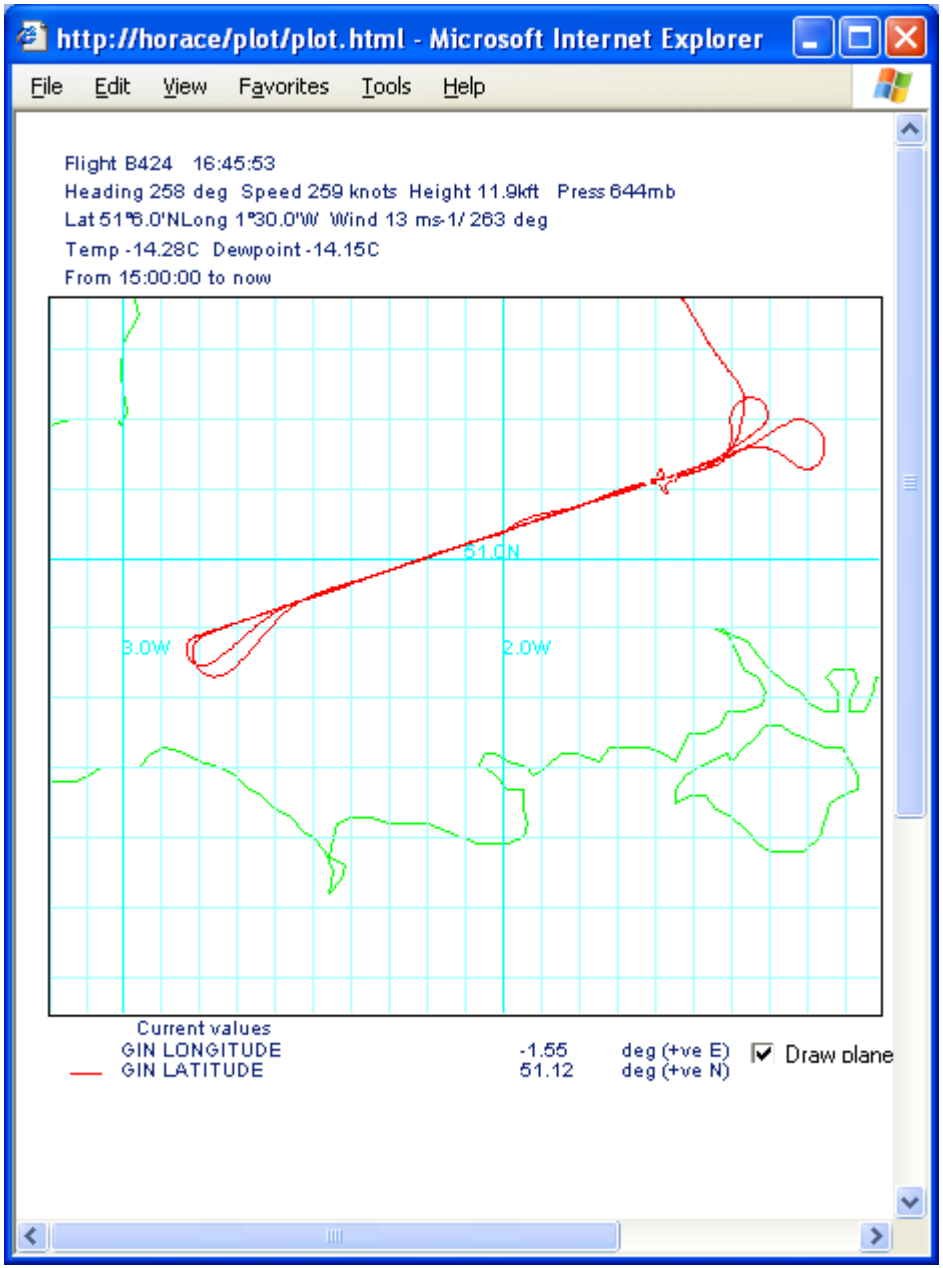
R4 - bumpy here



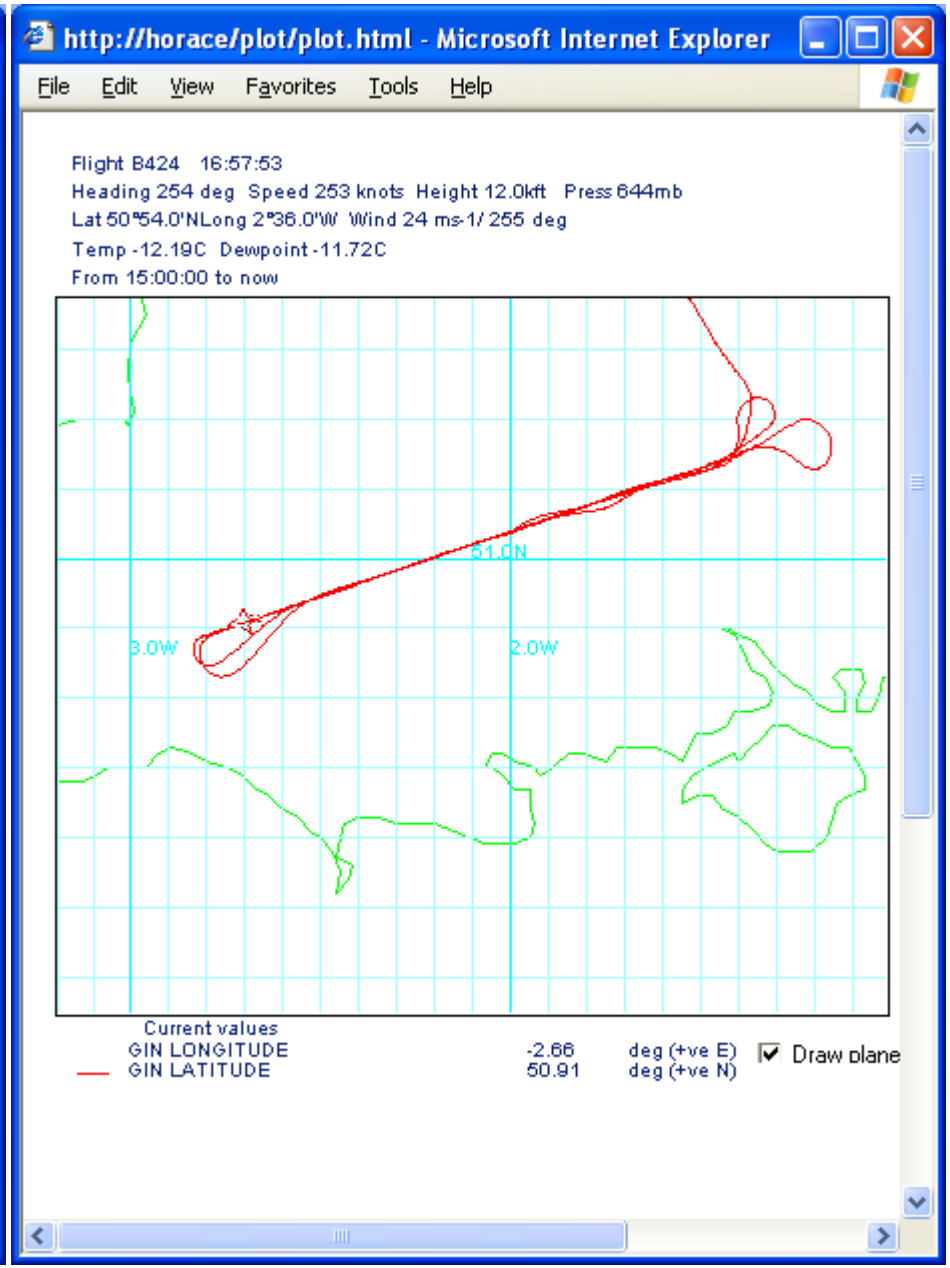
R4 overhead Chilbolton



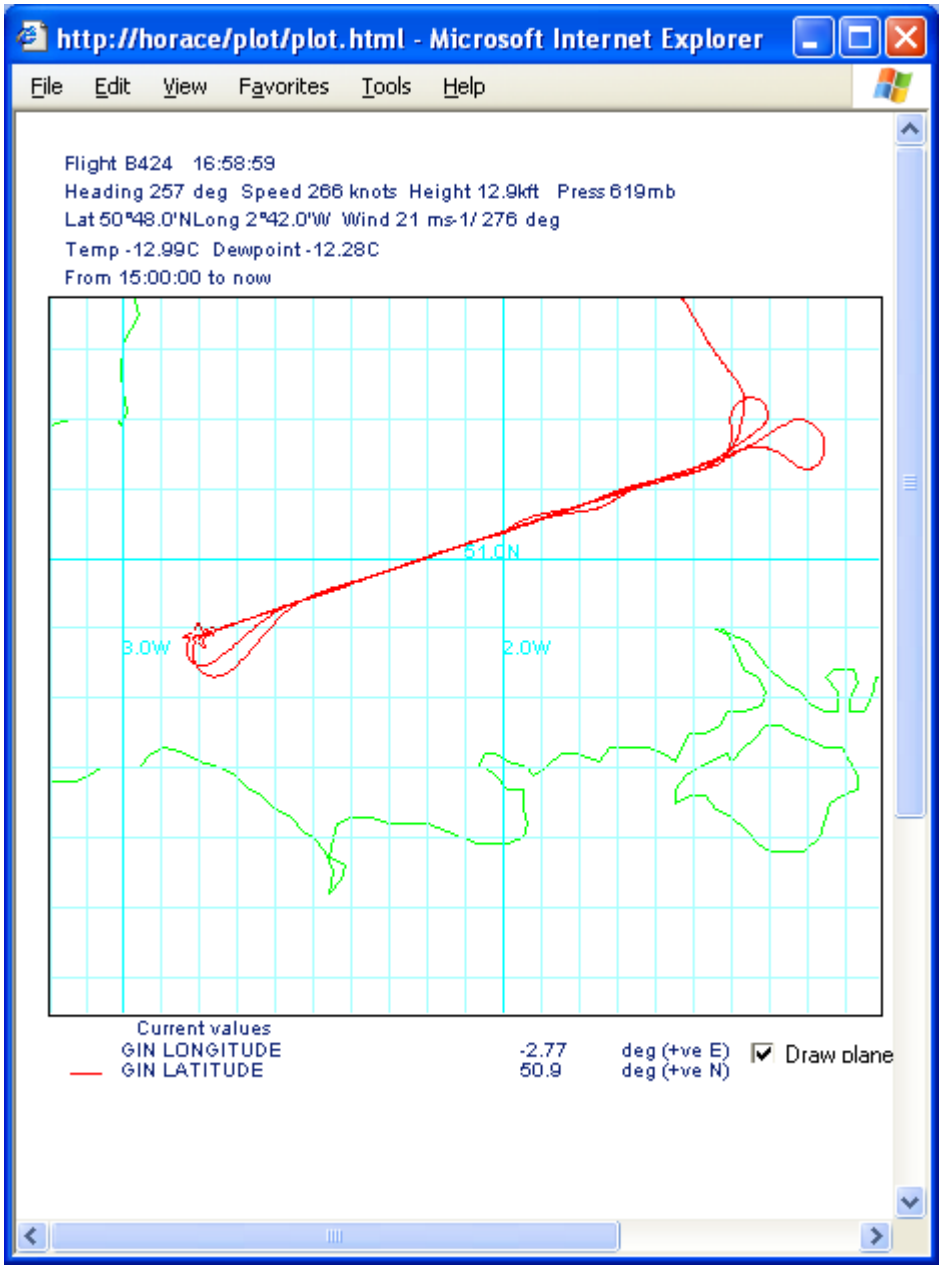
End R4, start P5 o/h Chilbolton



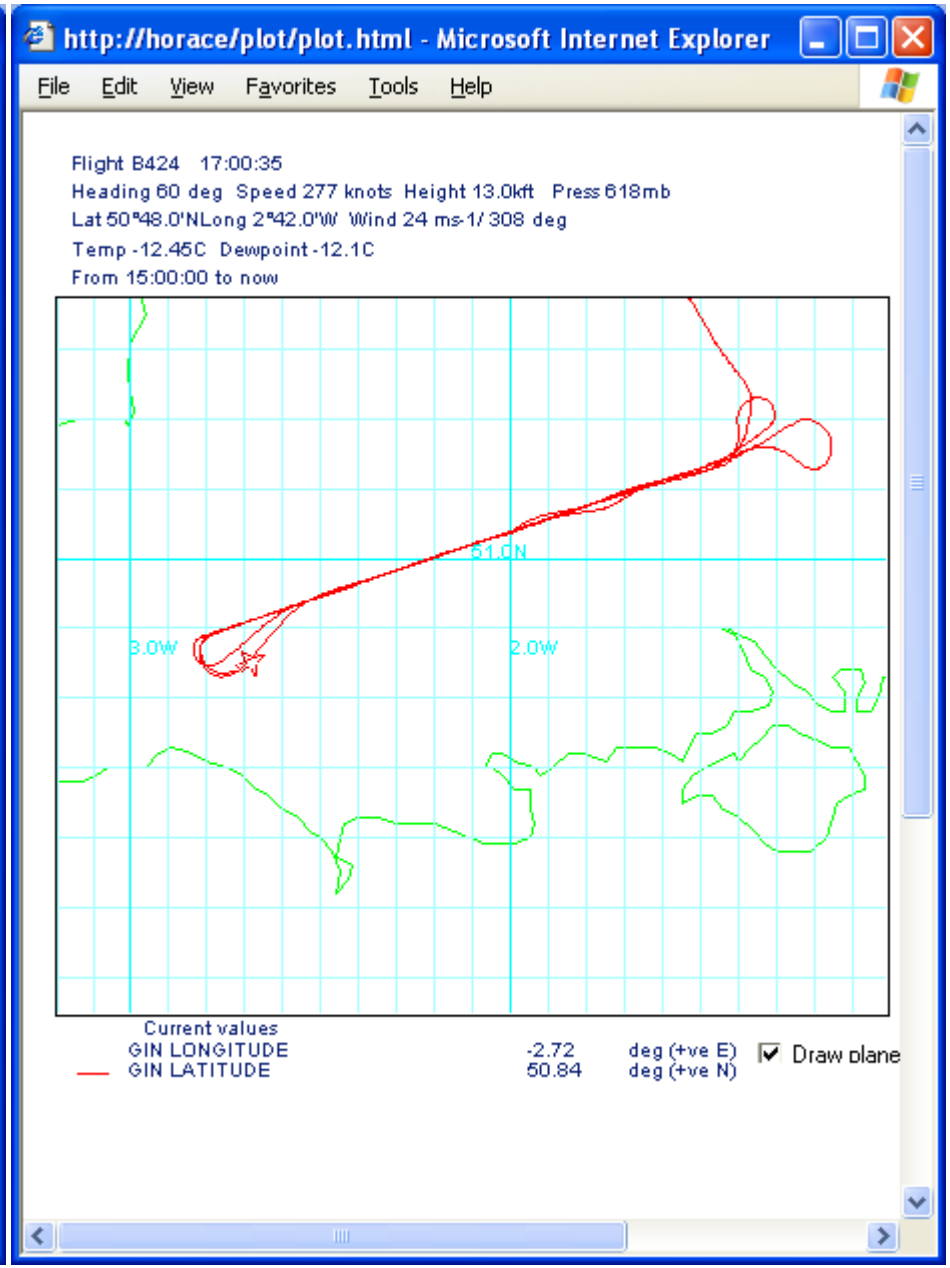
P5 end start R5 FL120



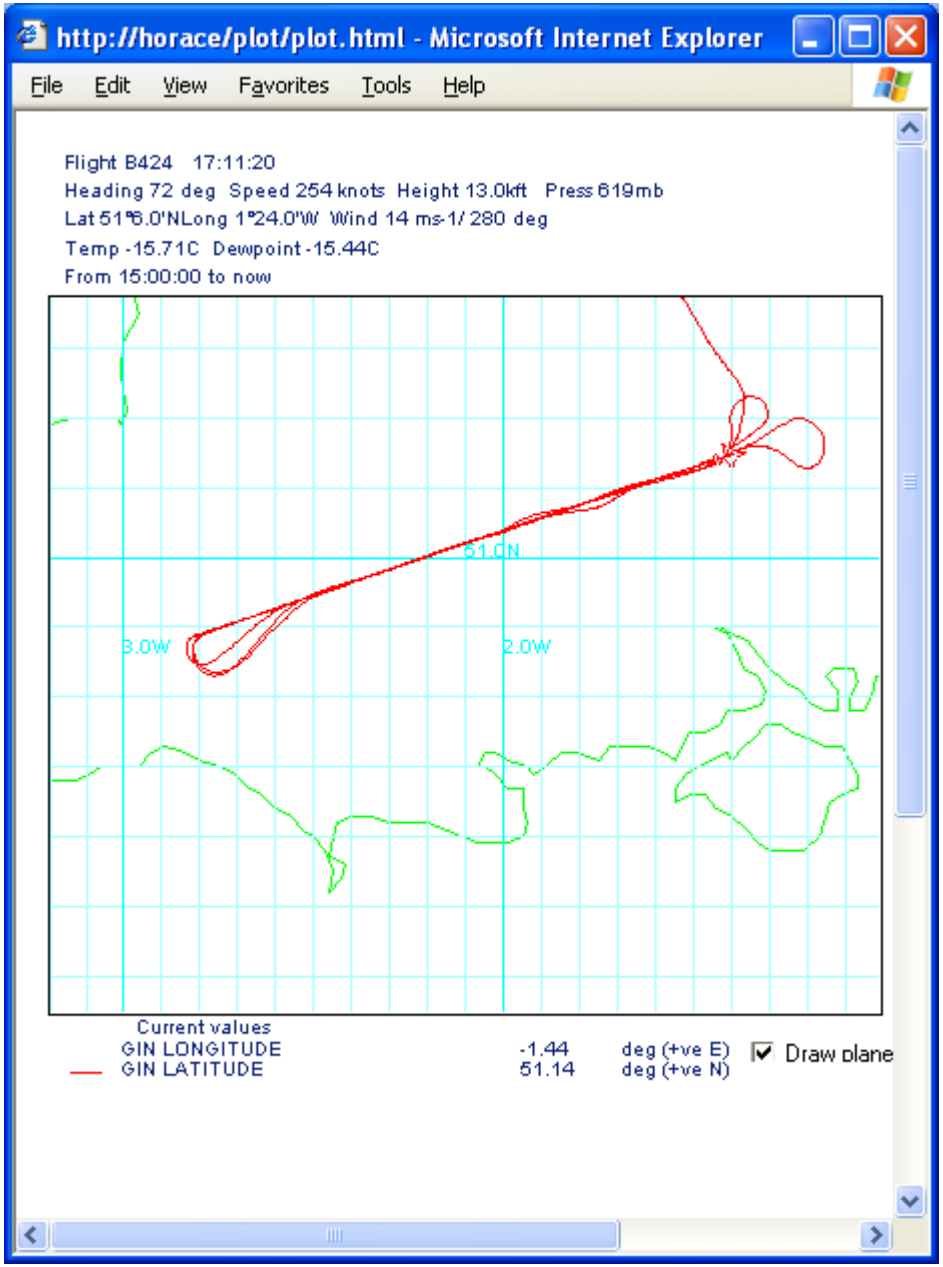
End R5 start P6 FL120



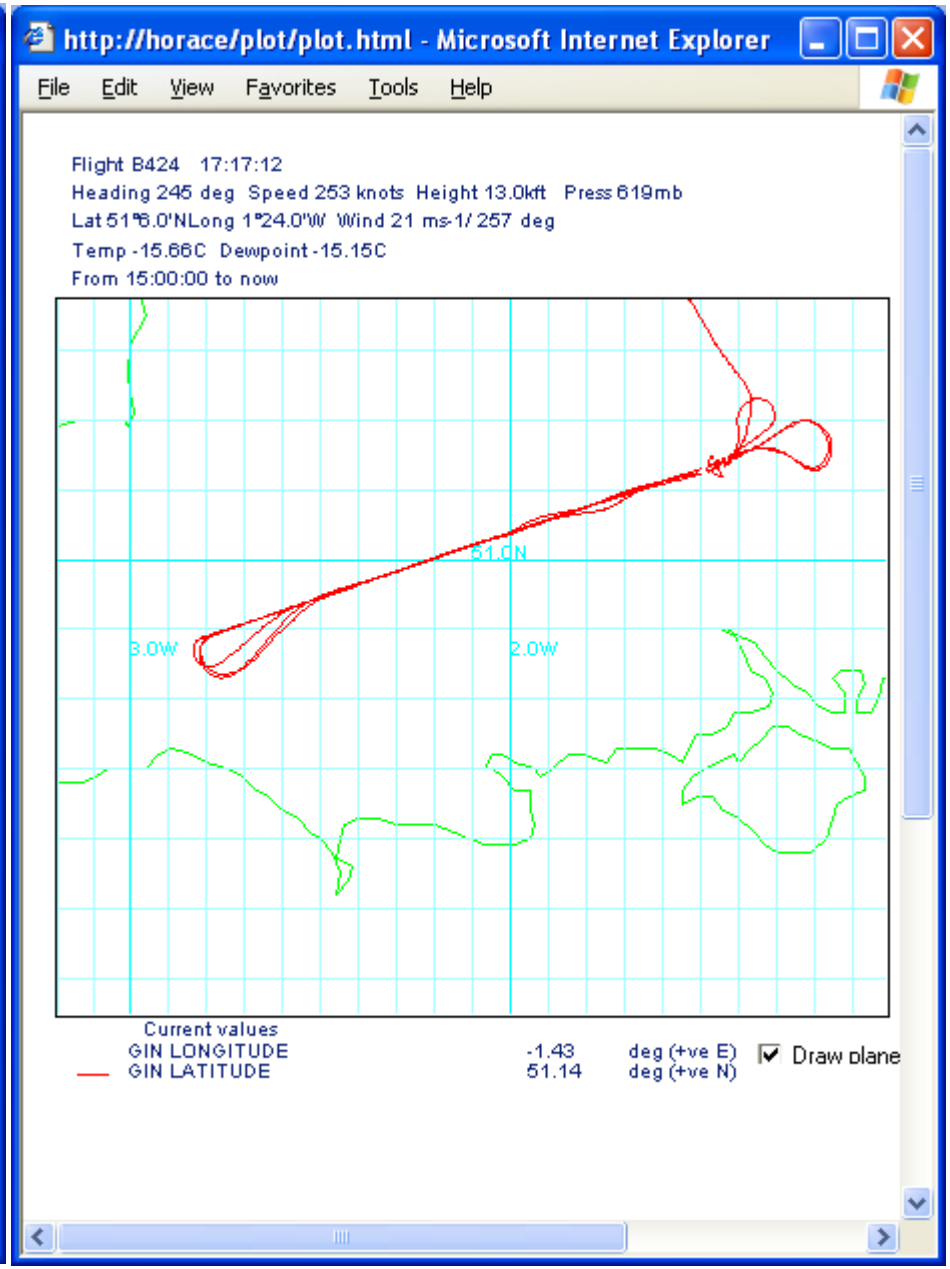
End P6 start R6 FL130 - now turn



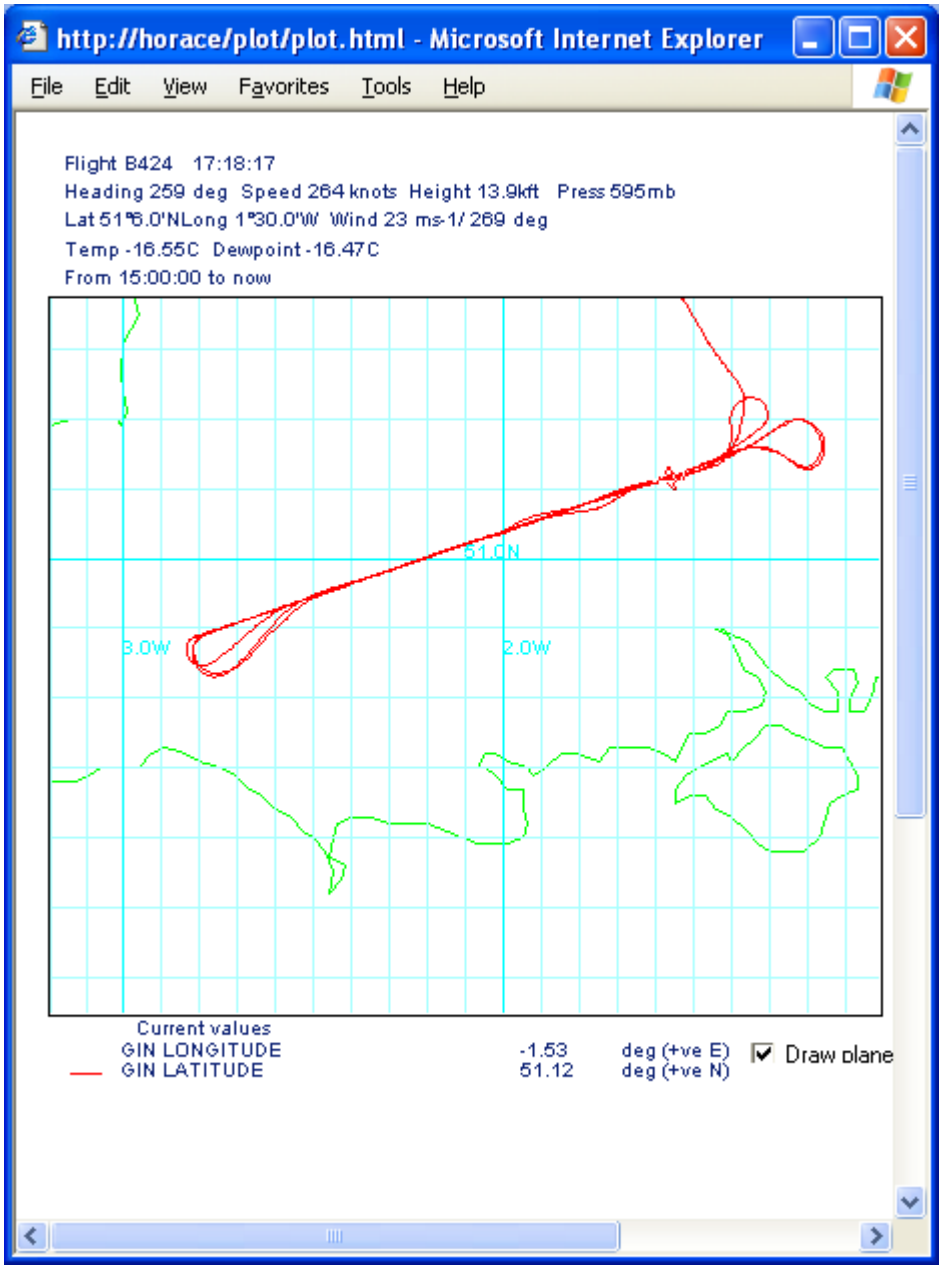
Turb in turn – Snow (R6)

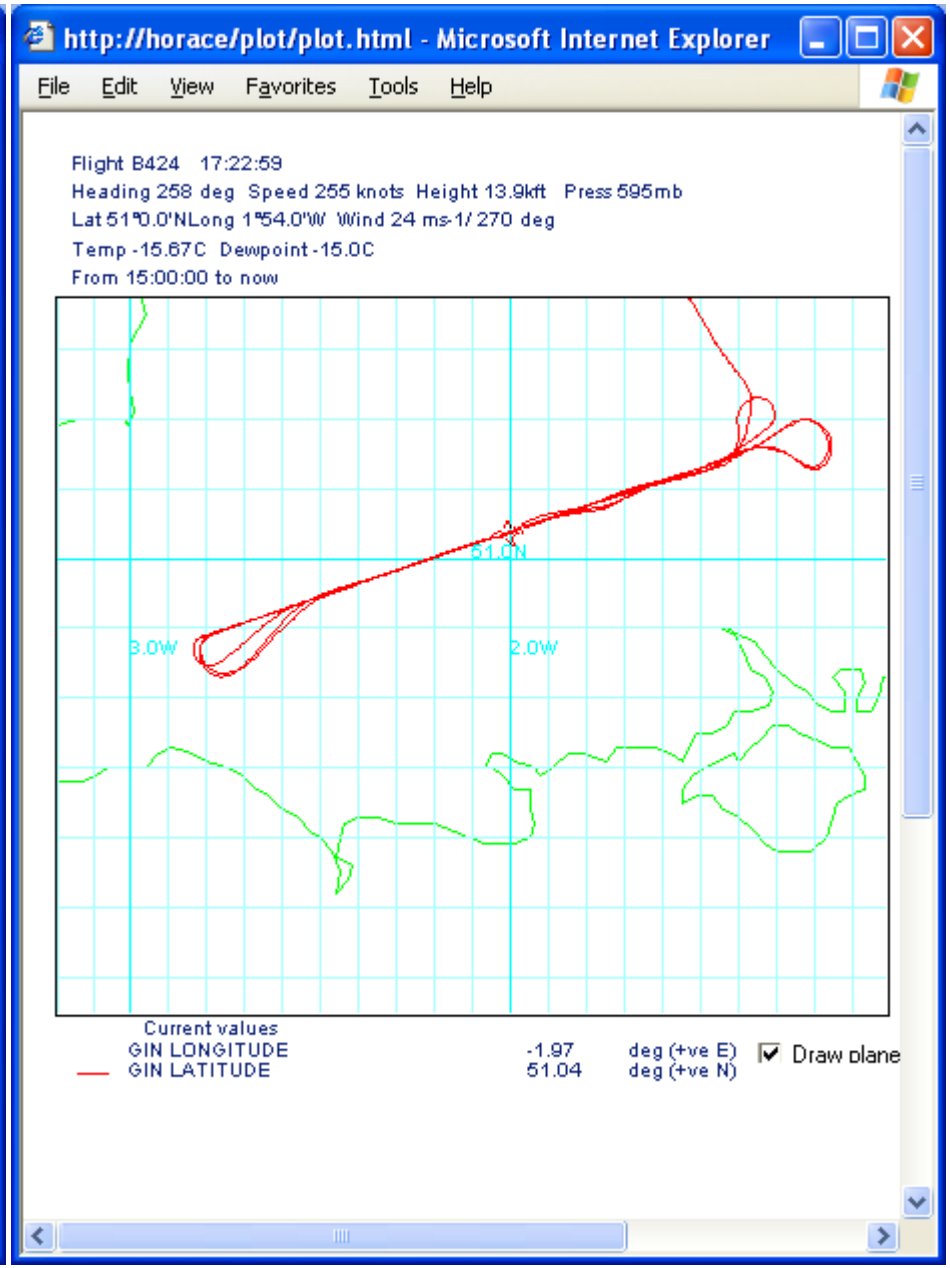


R6 Overhead Chilbolton

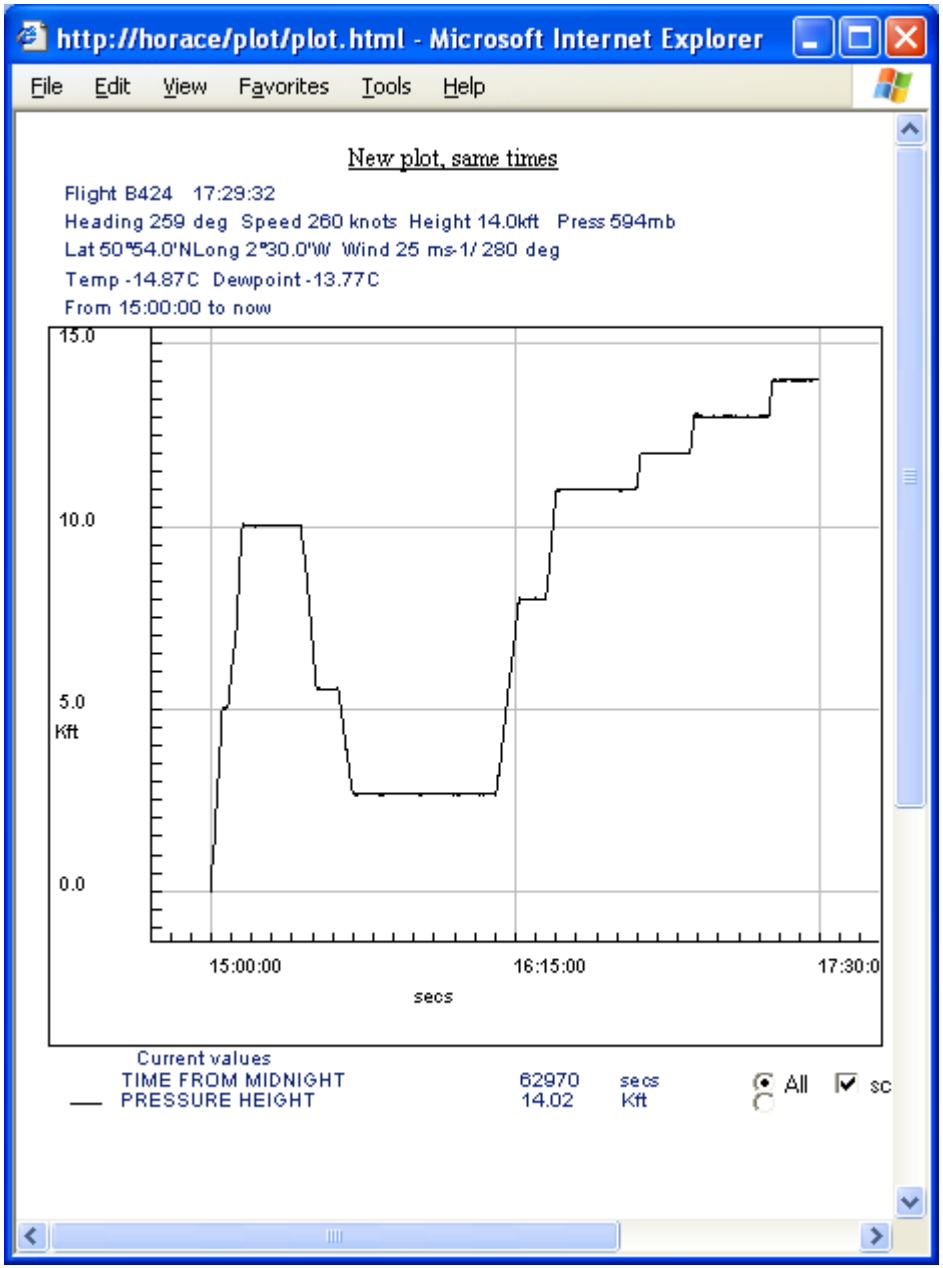


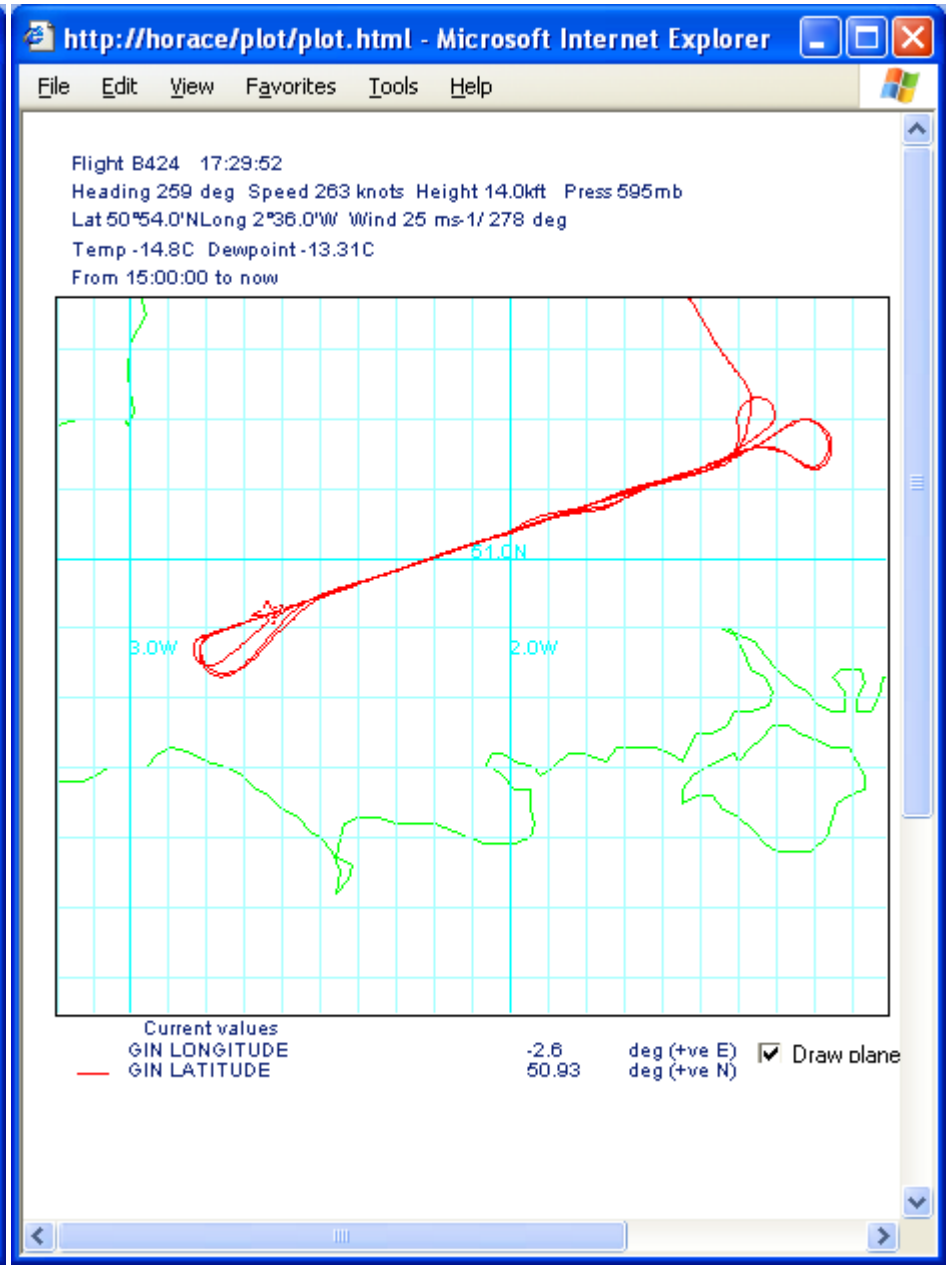
Overhead CH end R6 start P7



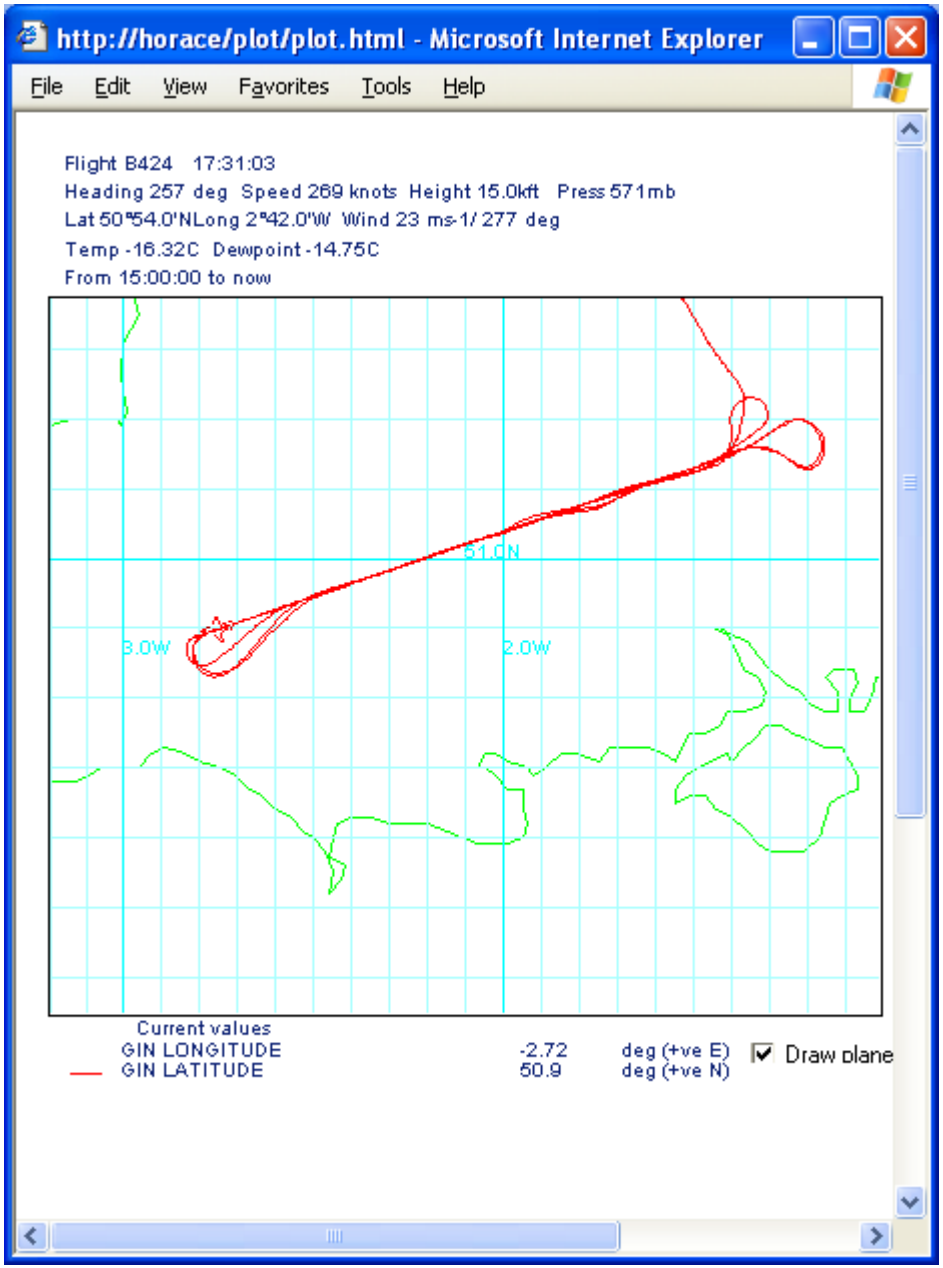


End P7 start R7

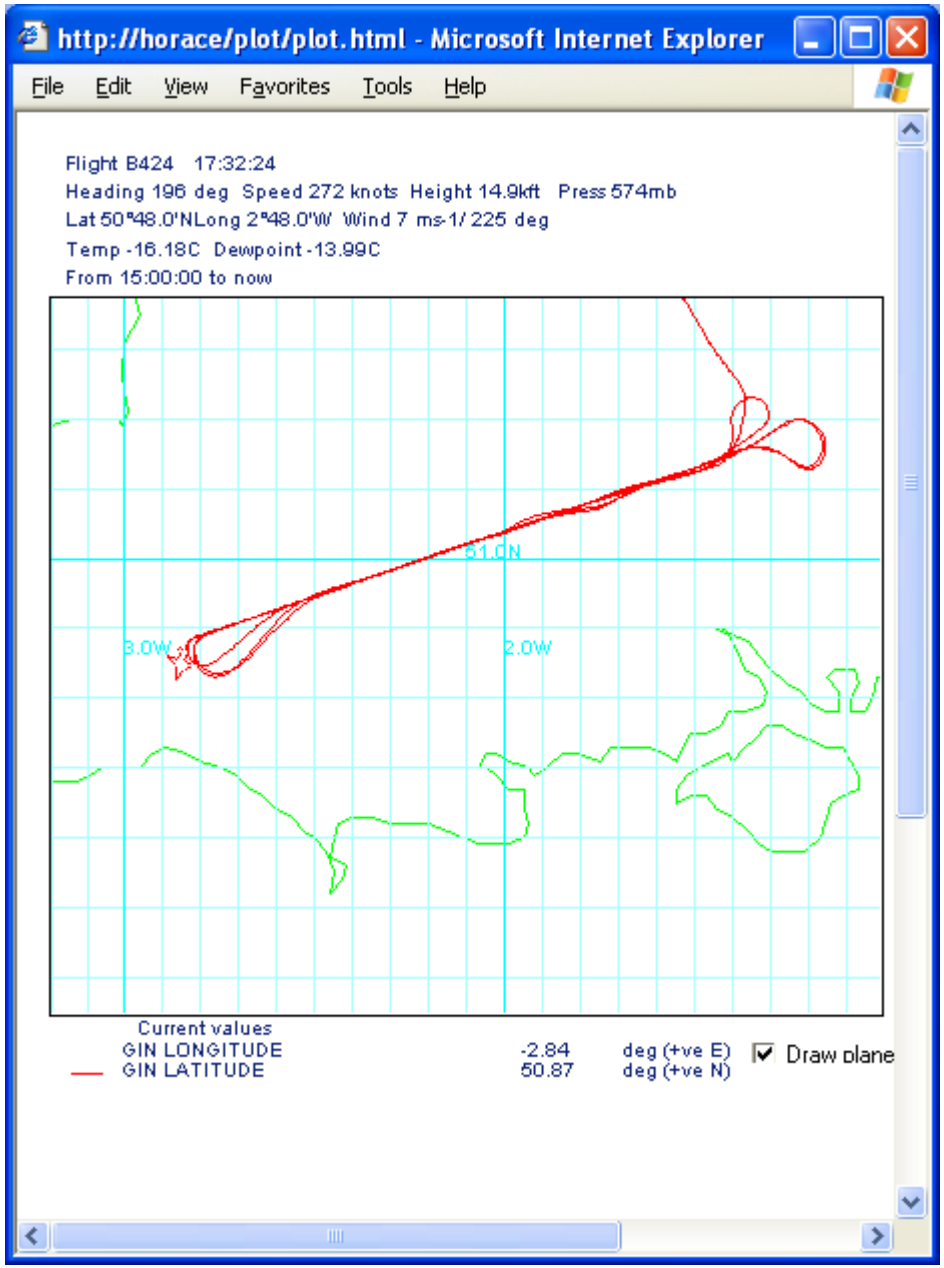




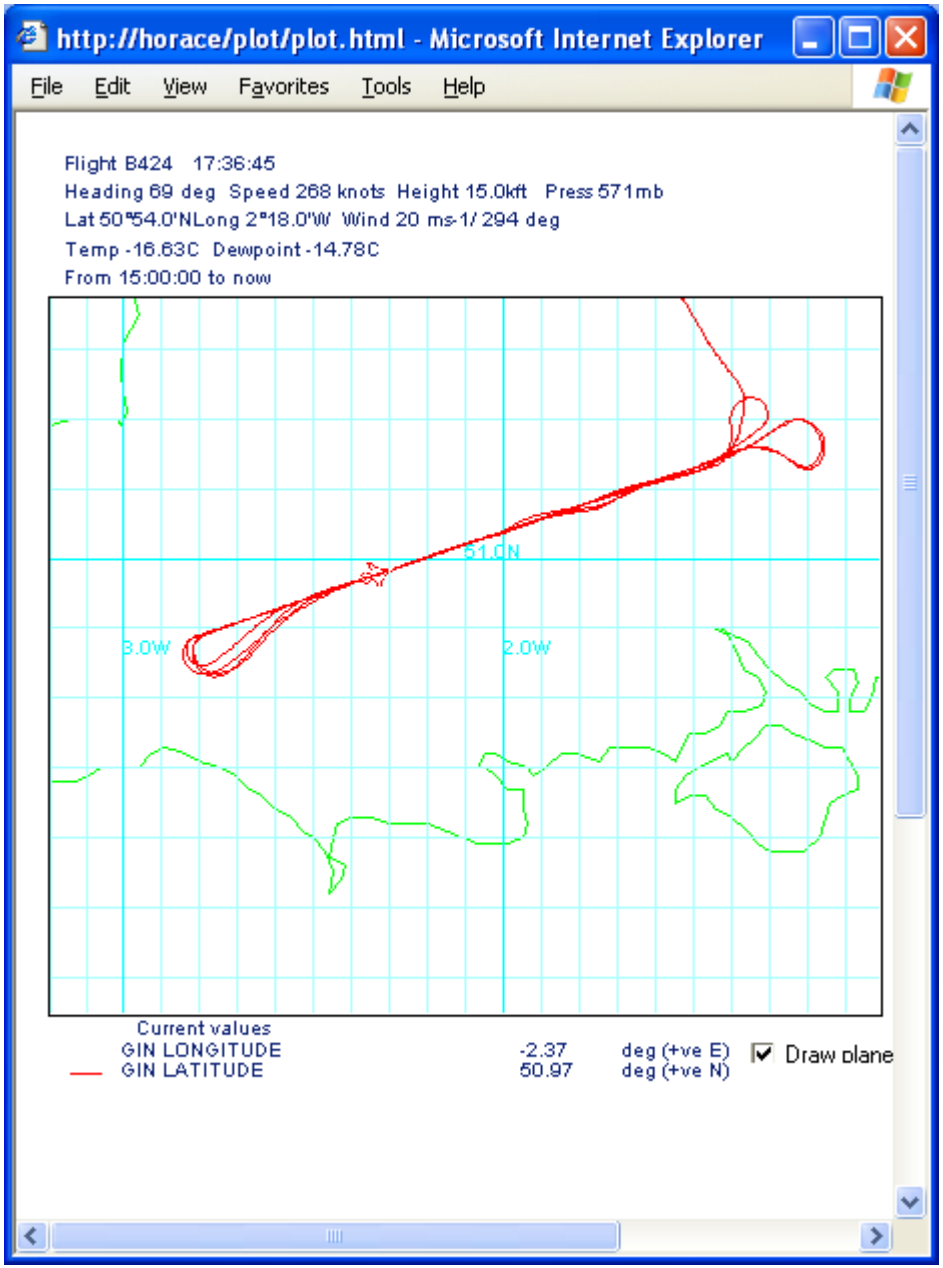
End R7 start P8



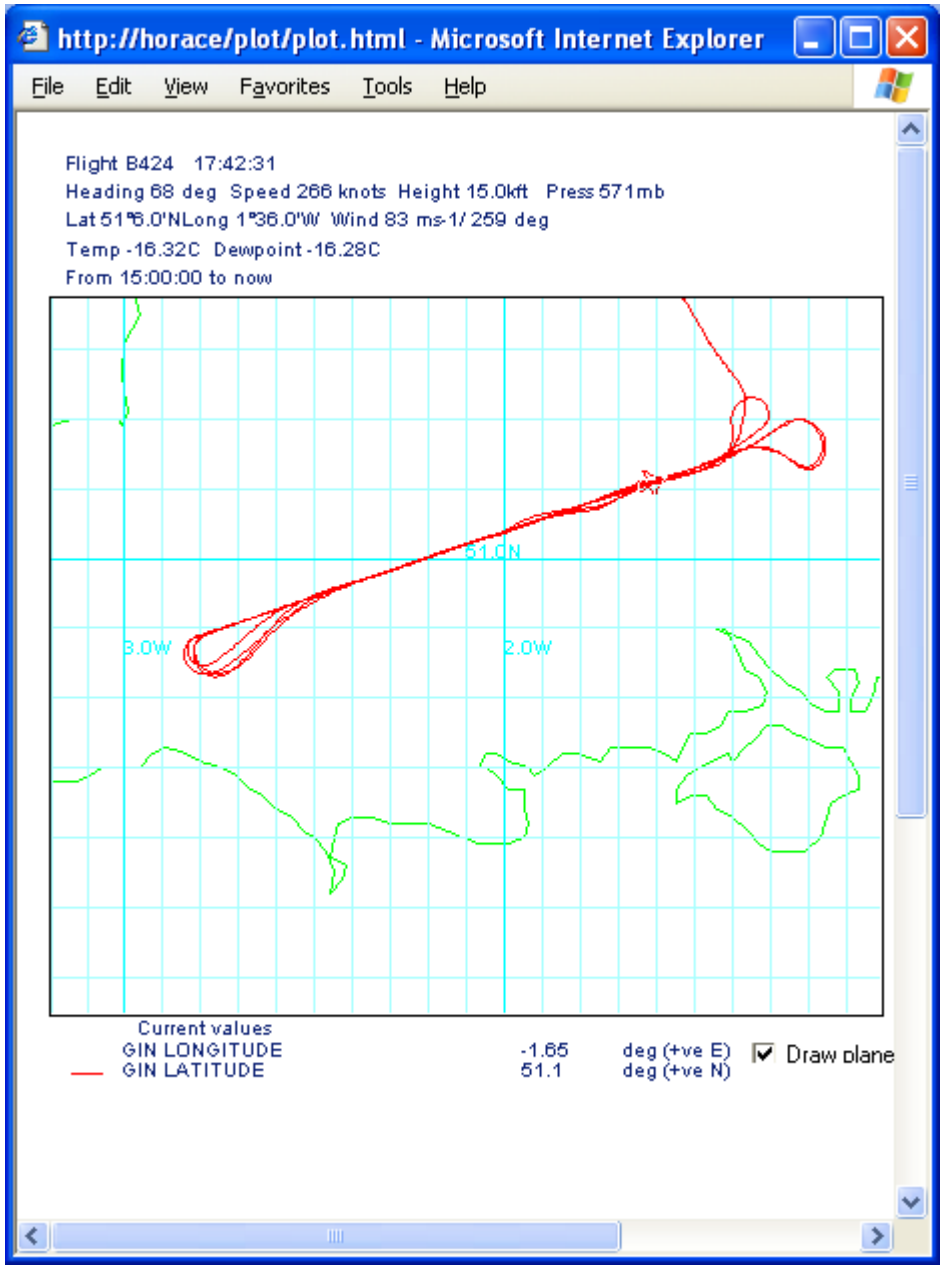
P8 end, start of R8 at FL150



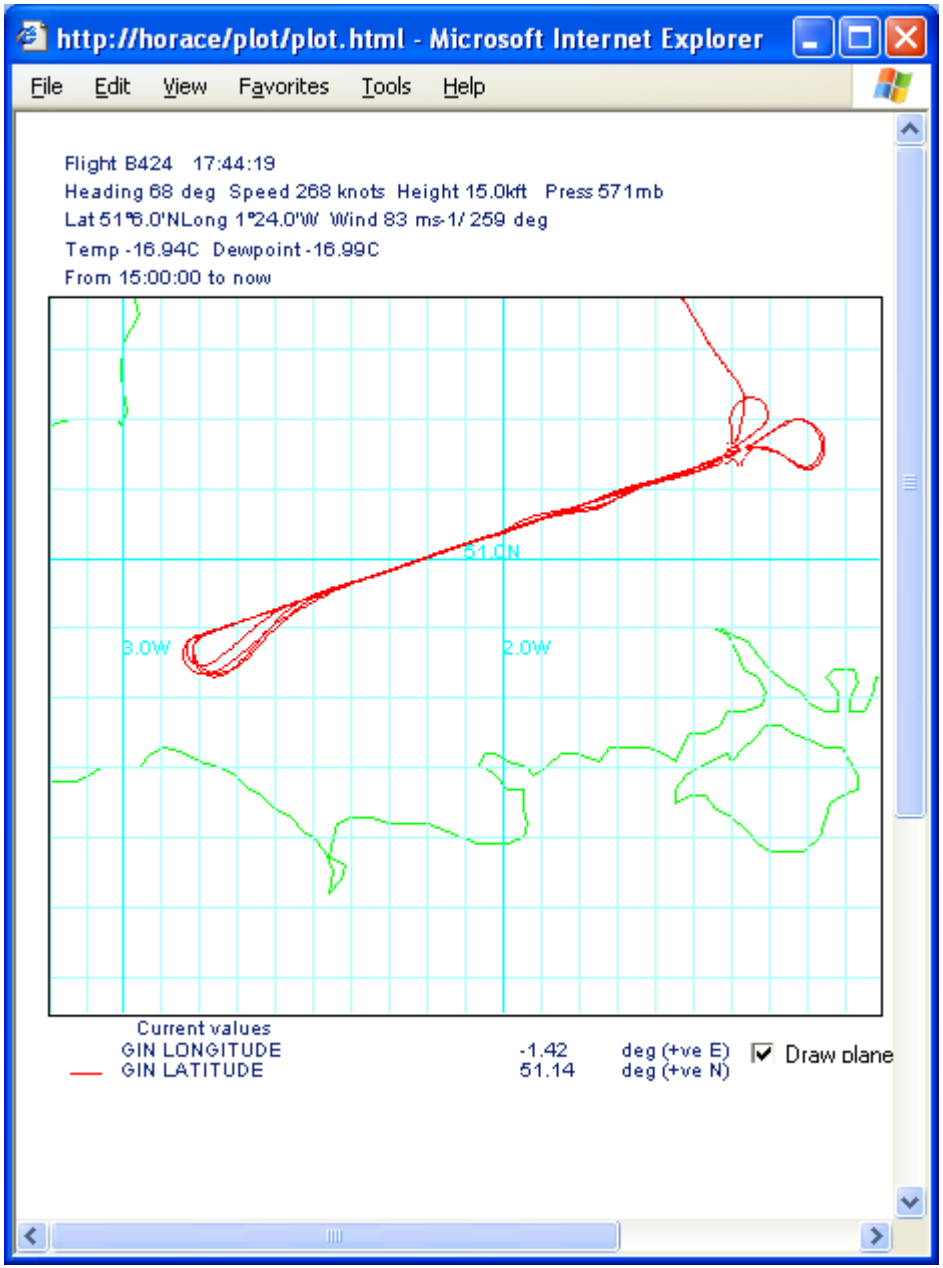
Supercooled water in updraught



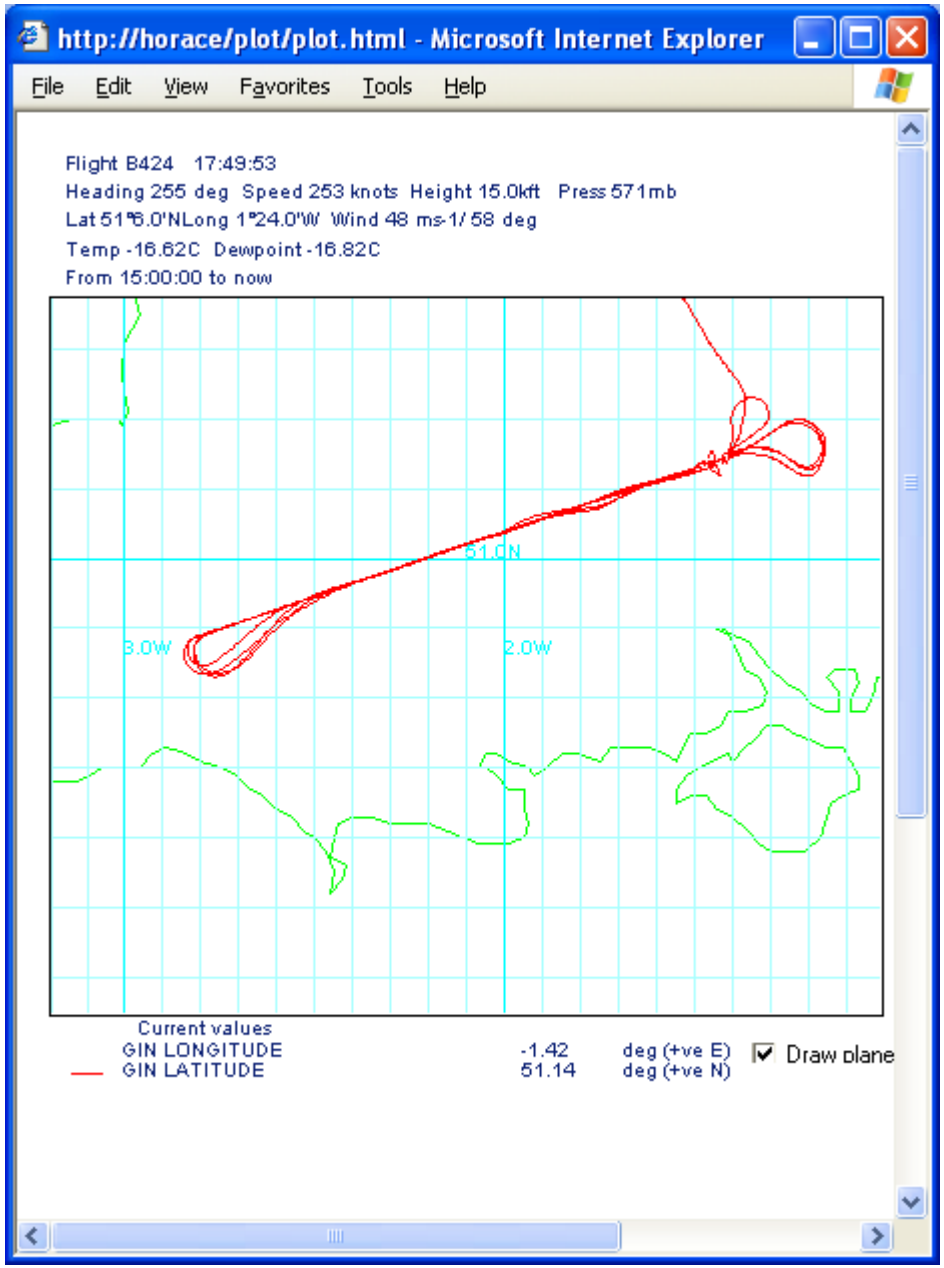
R8 – “CPI”supercooled H2O



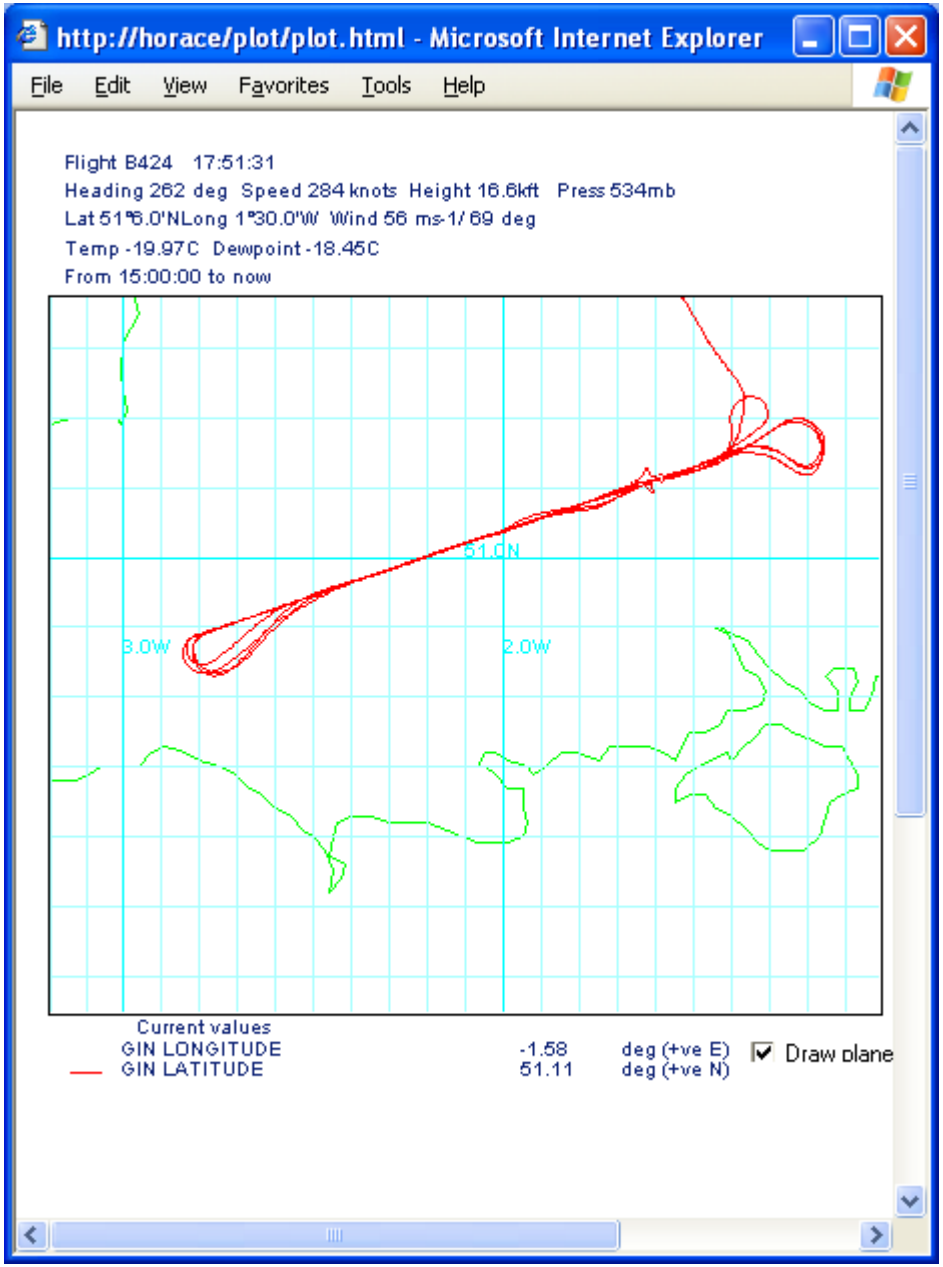
Temp PIP bimodal spectrum



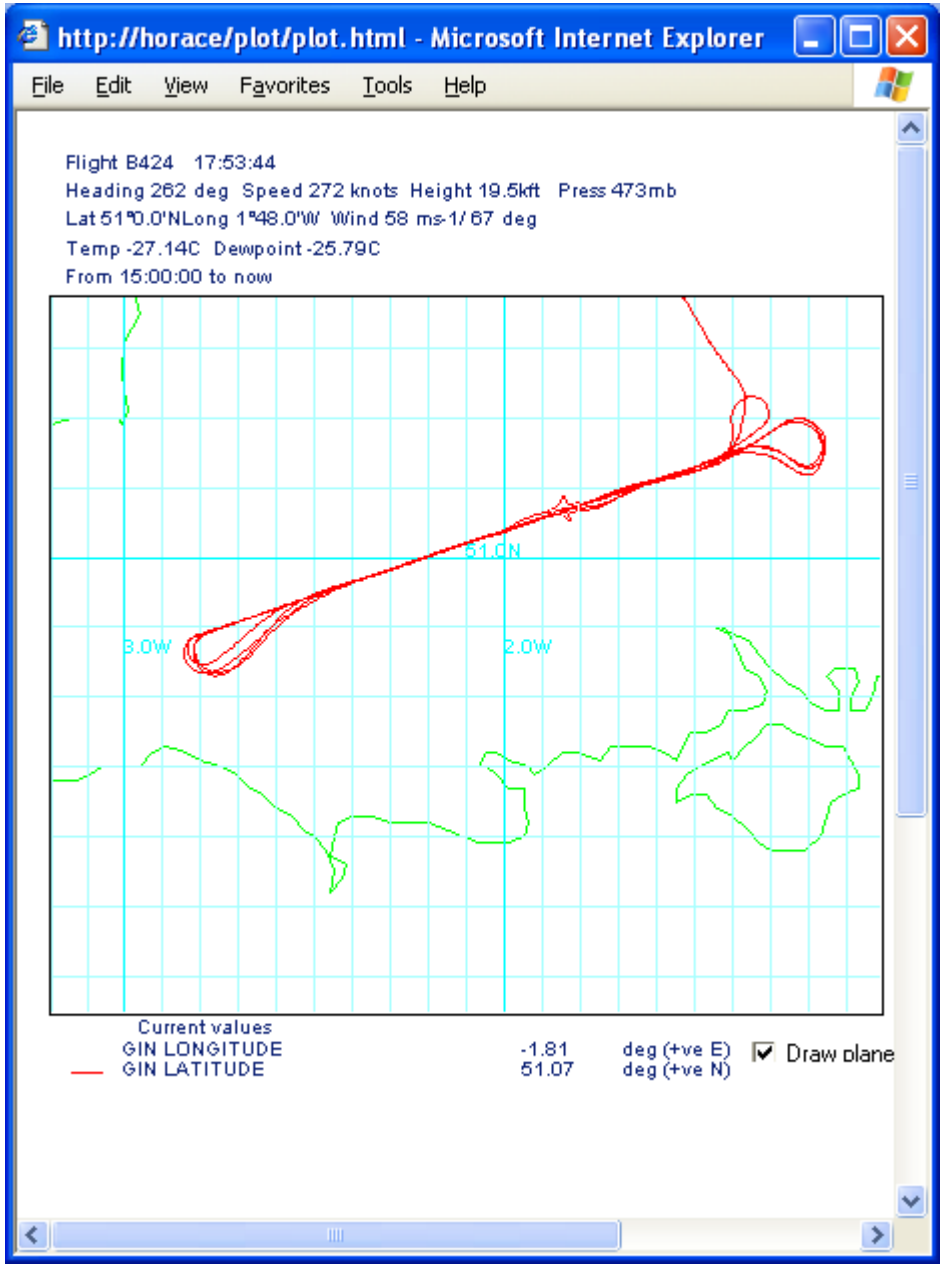
R8 overhead Chilbolton



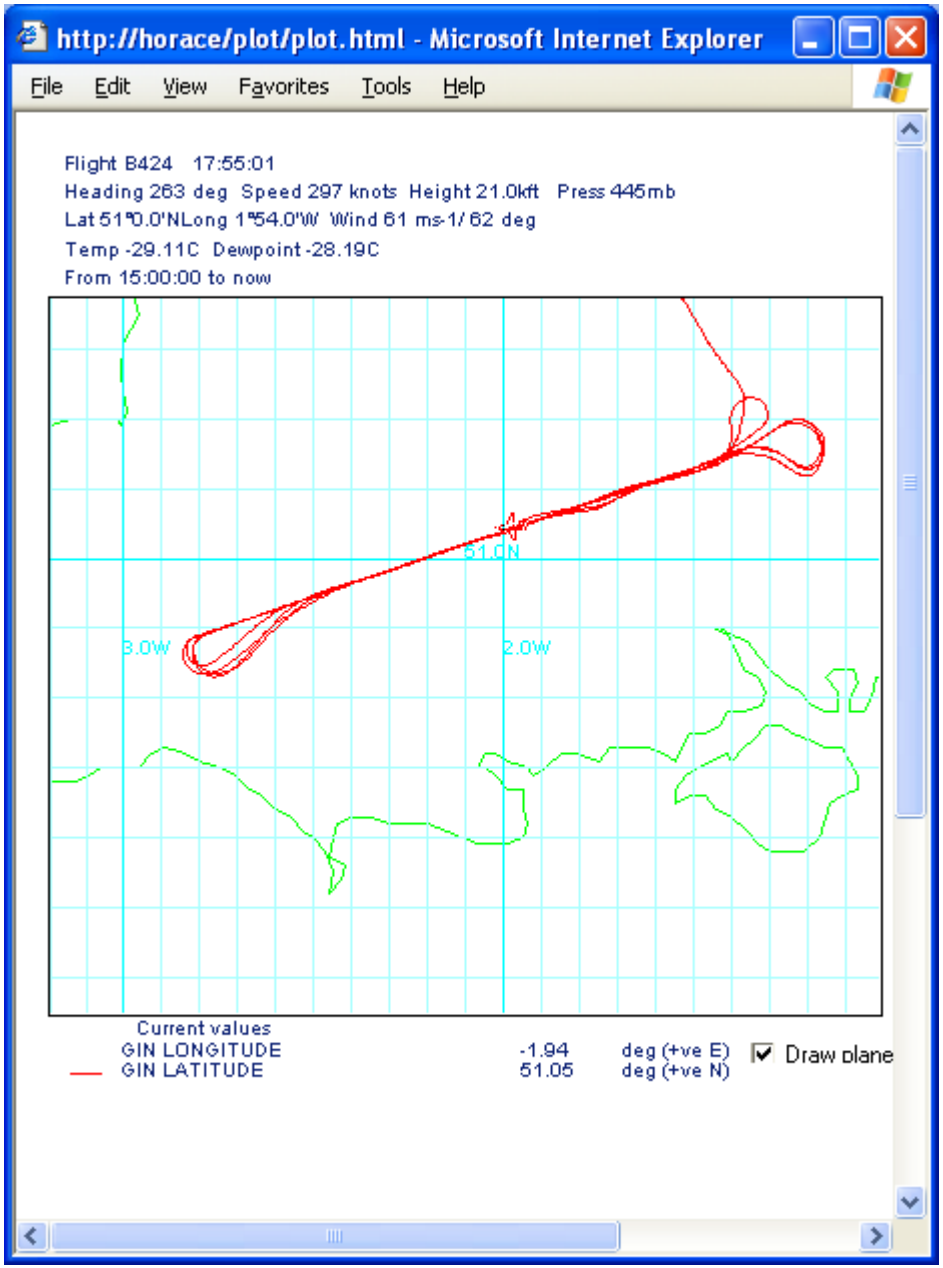
R8 end over CH start P9



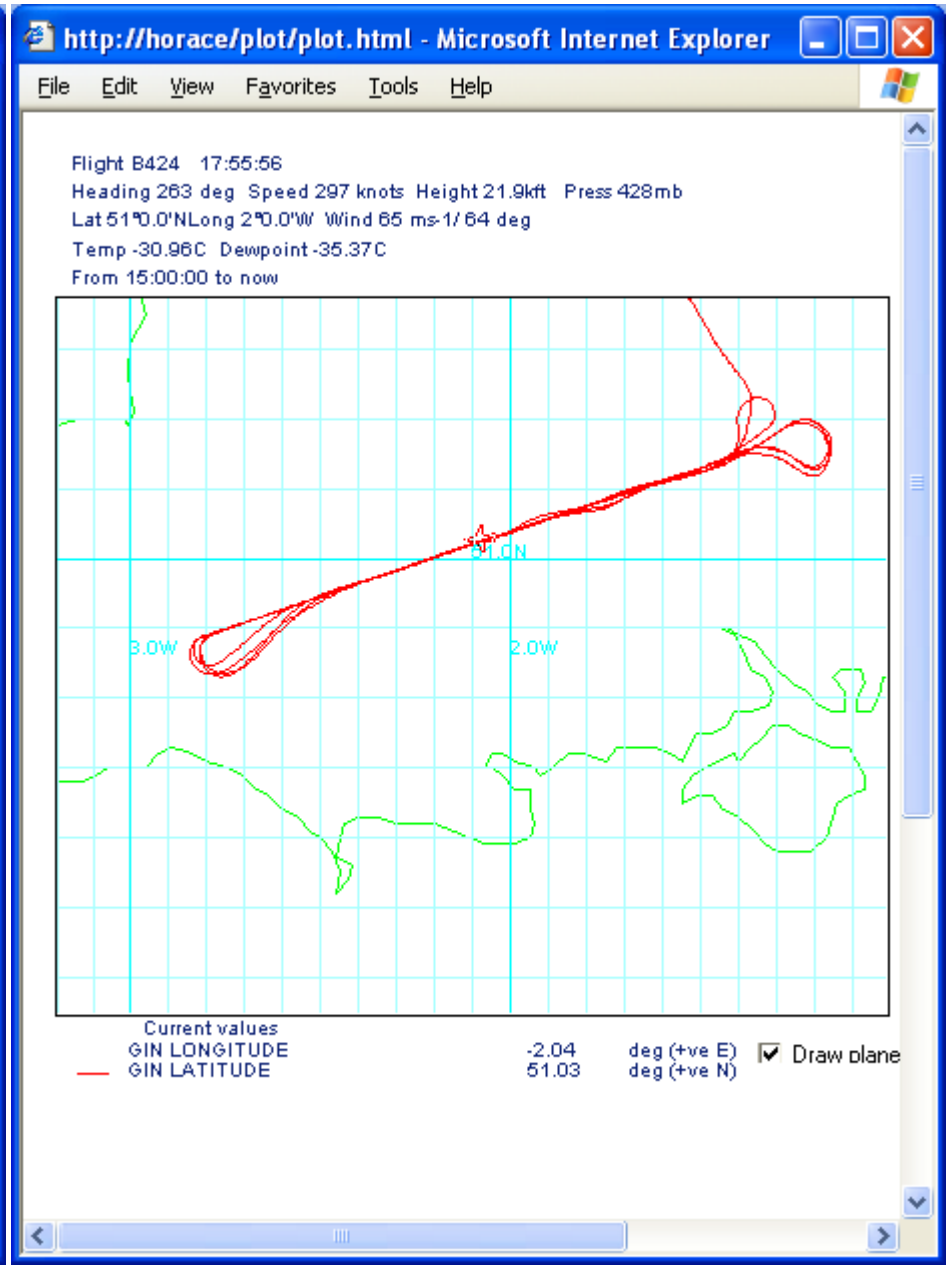
P9 - Out through CT



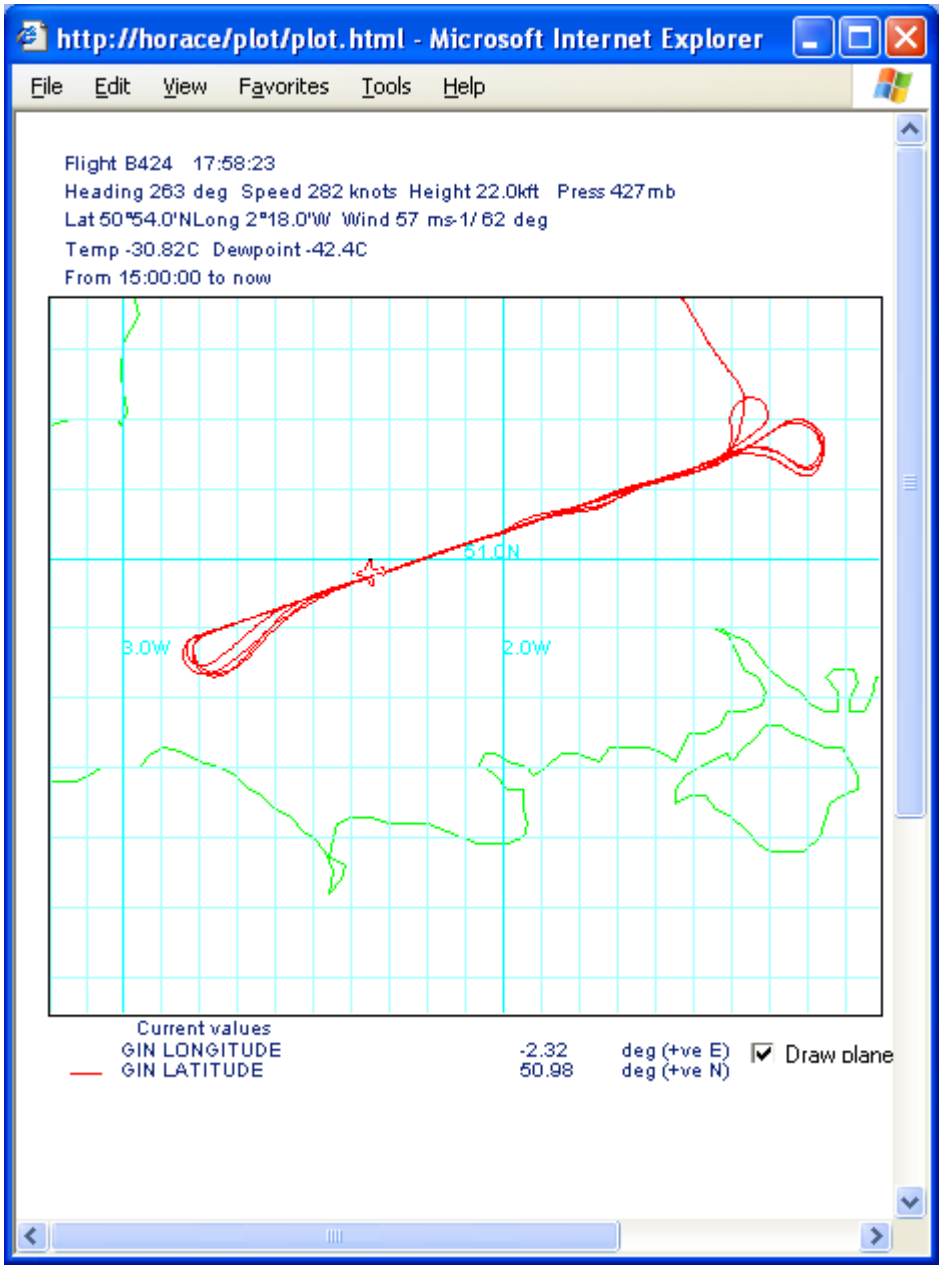
P9 - Back in cloud



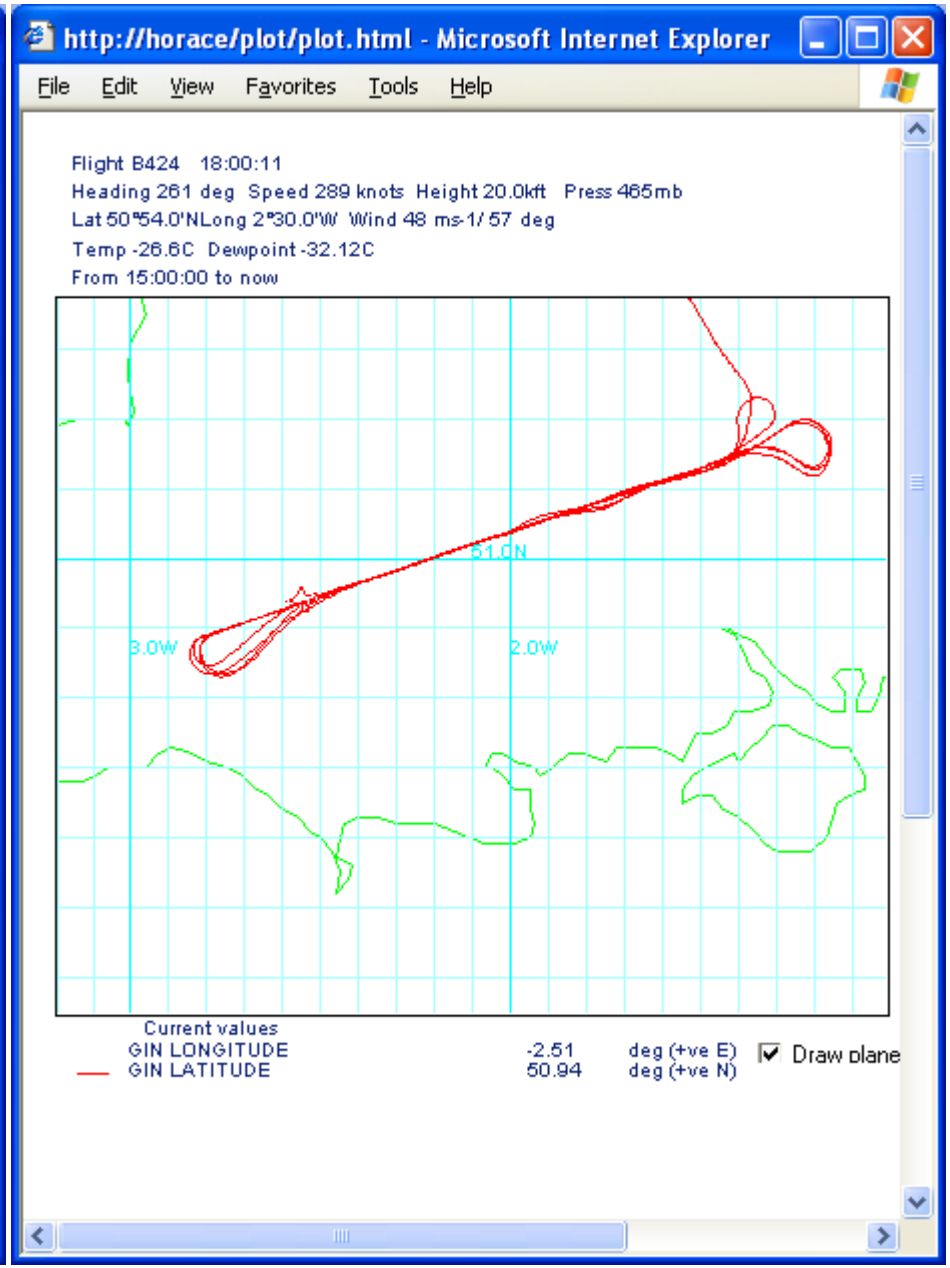
P9 - Through main CT



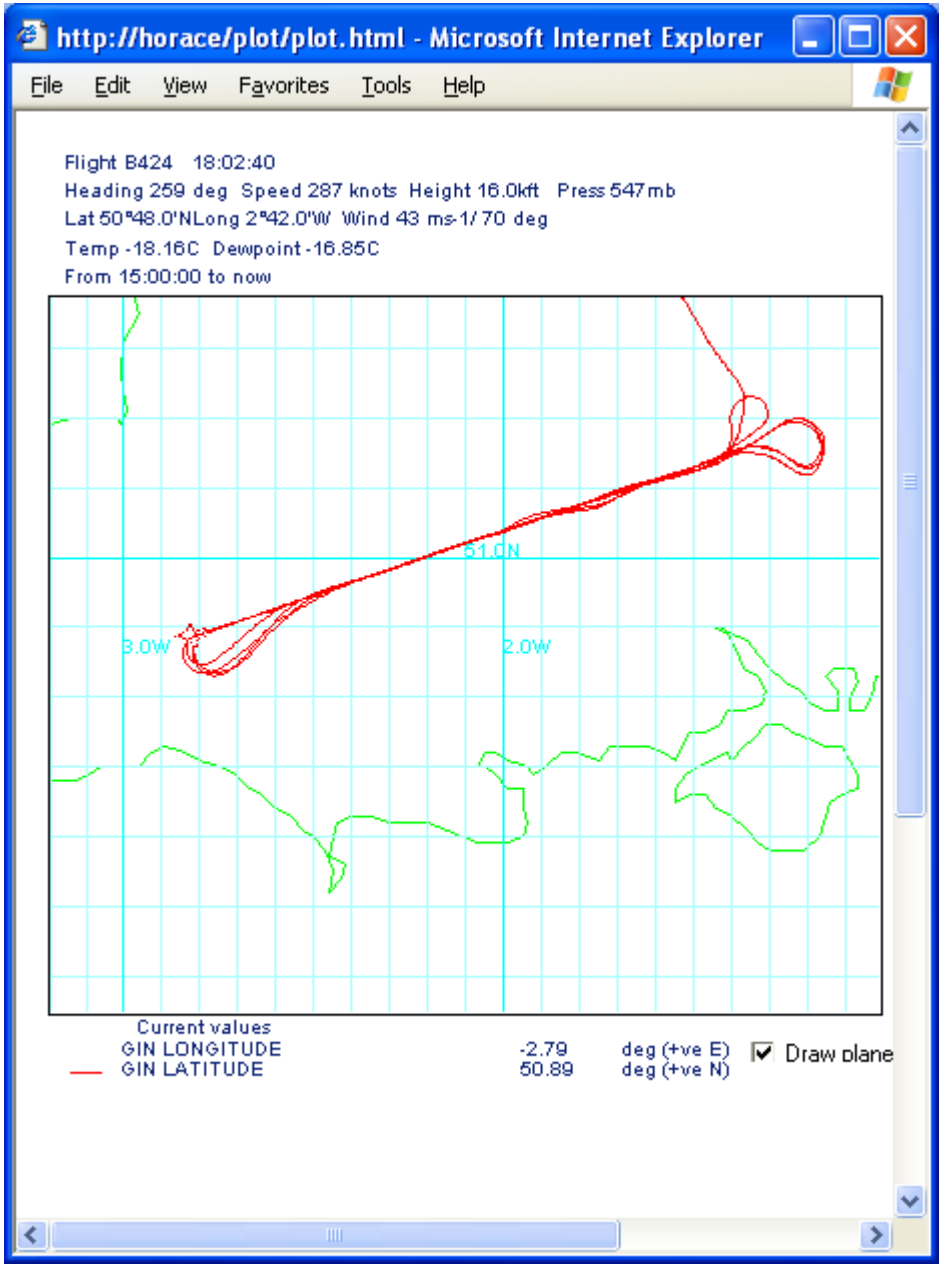
End P9 start R 9



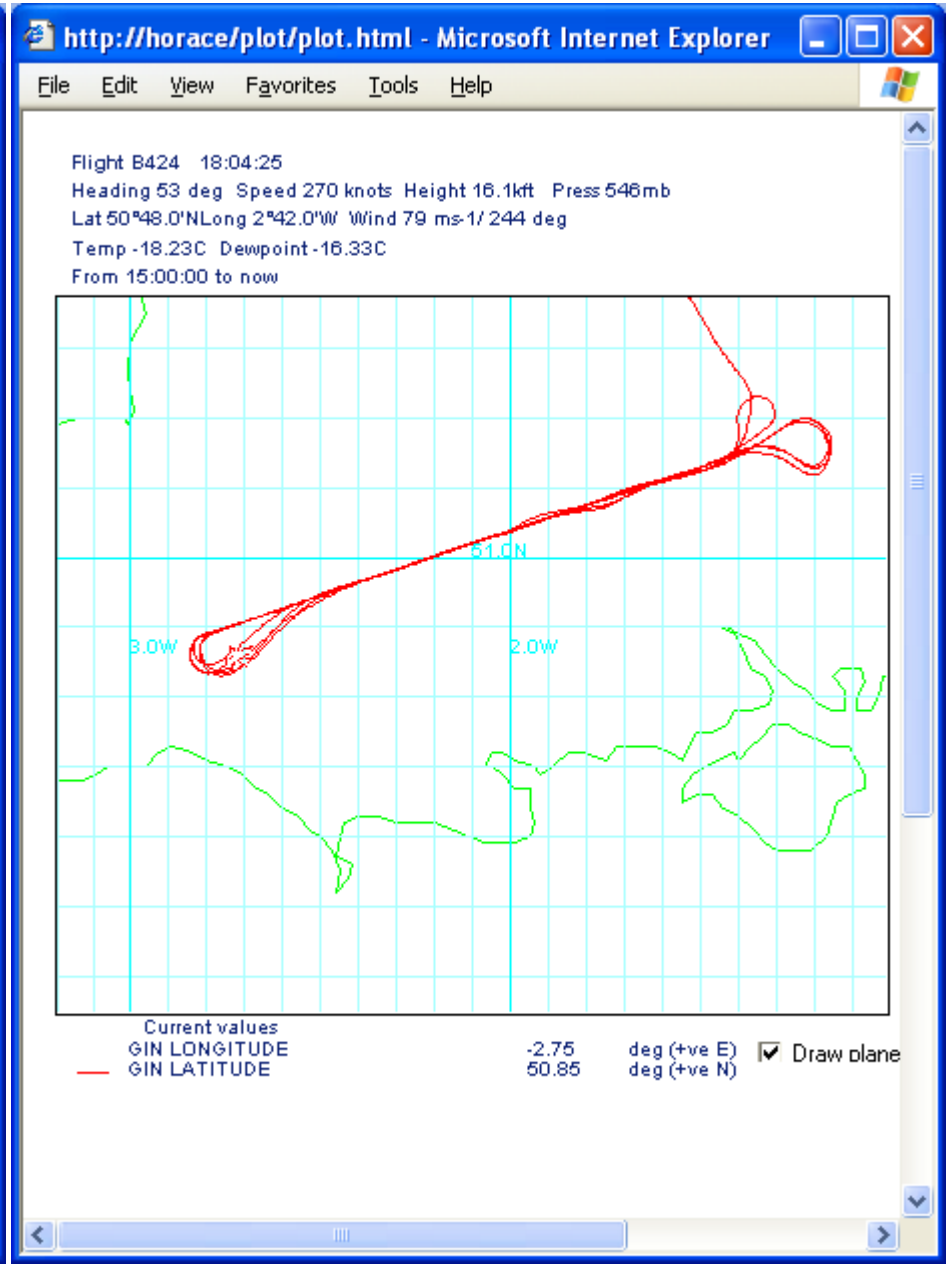
R9 end P10 start



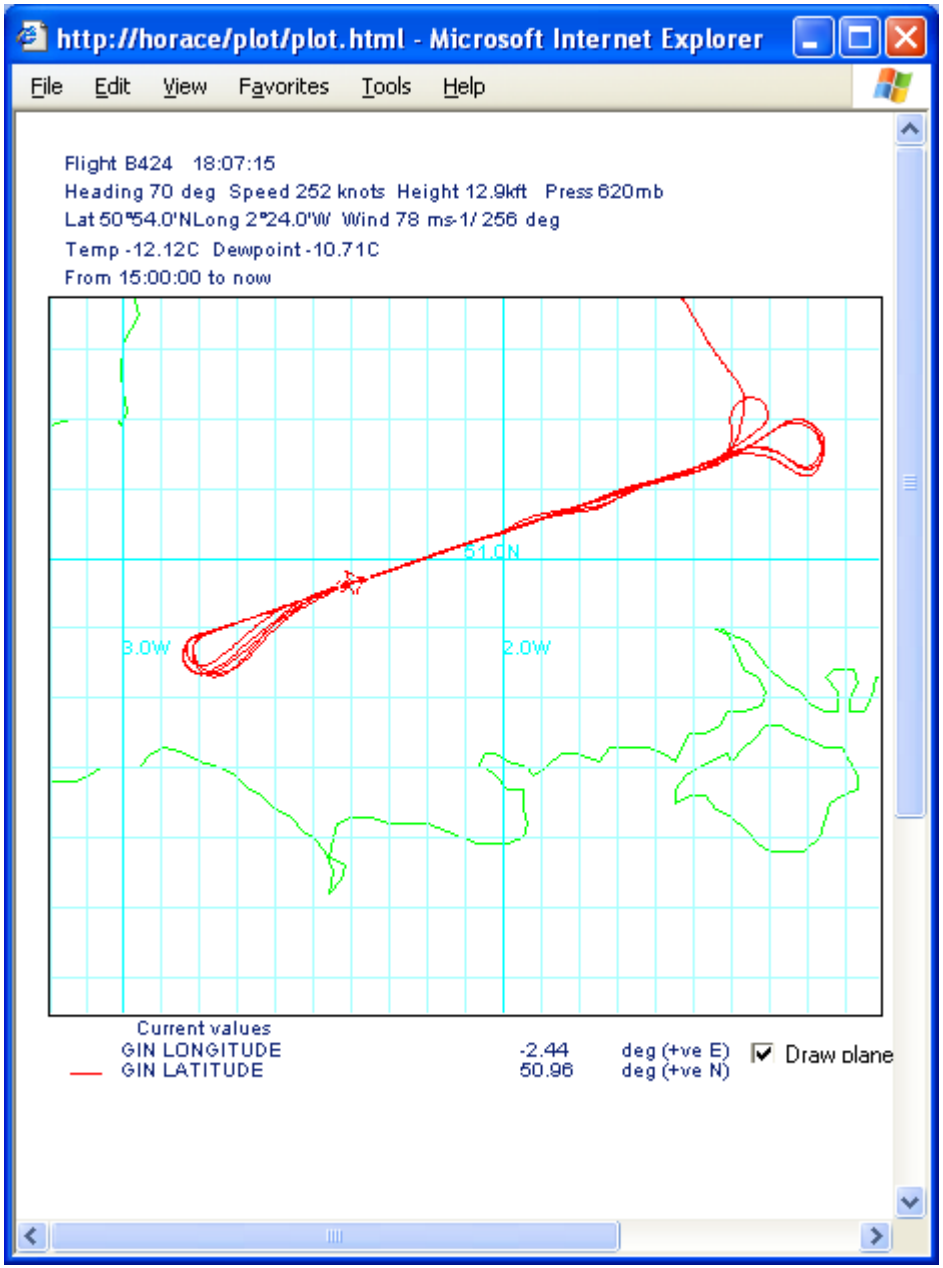
P10 CT

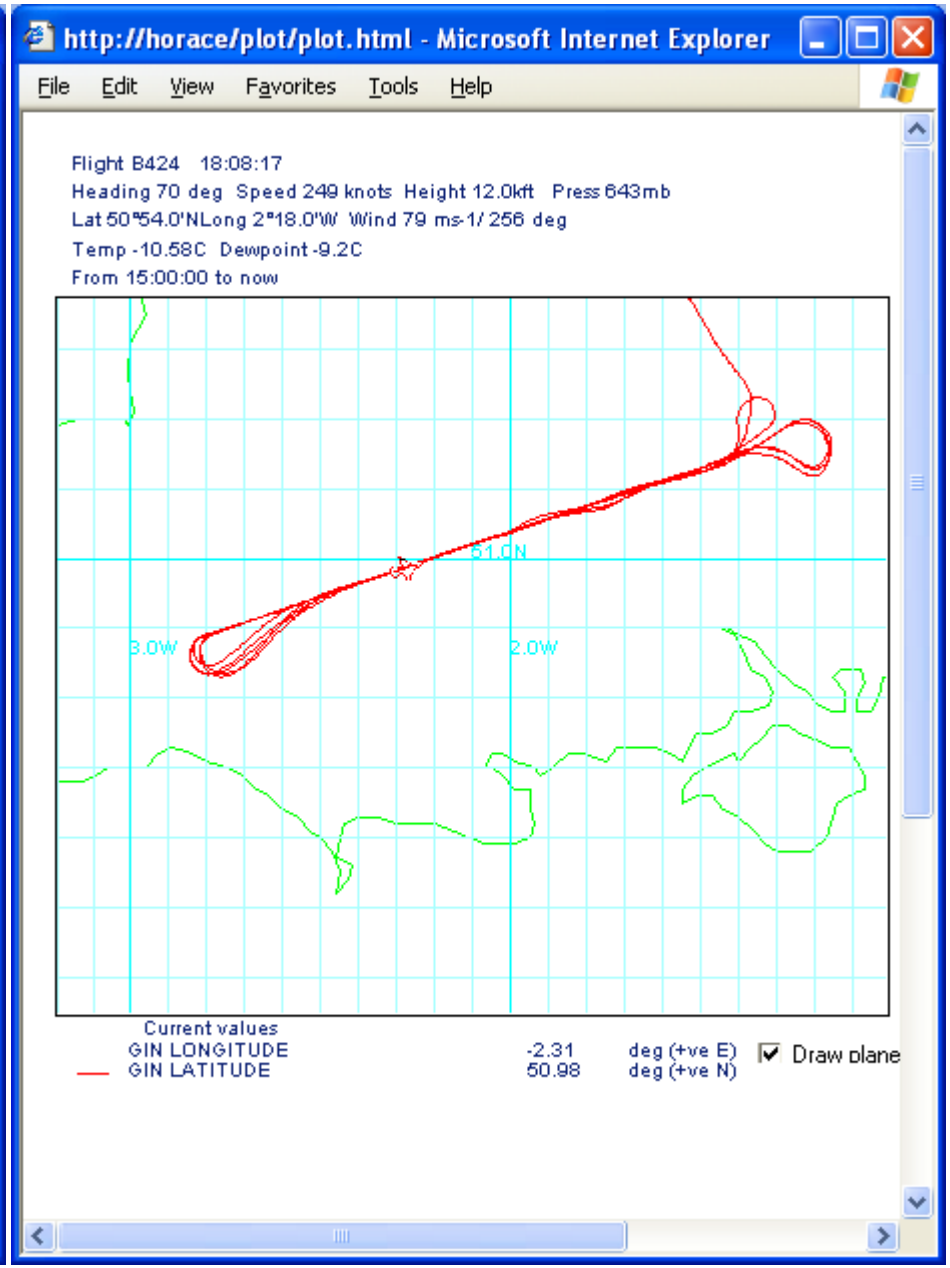


P10 int



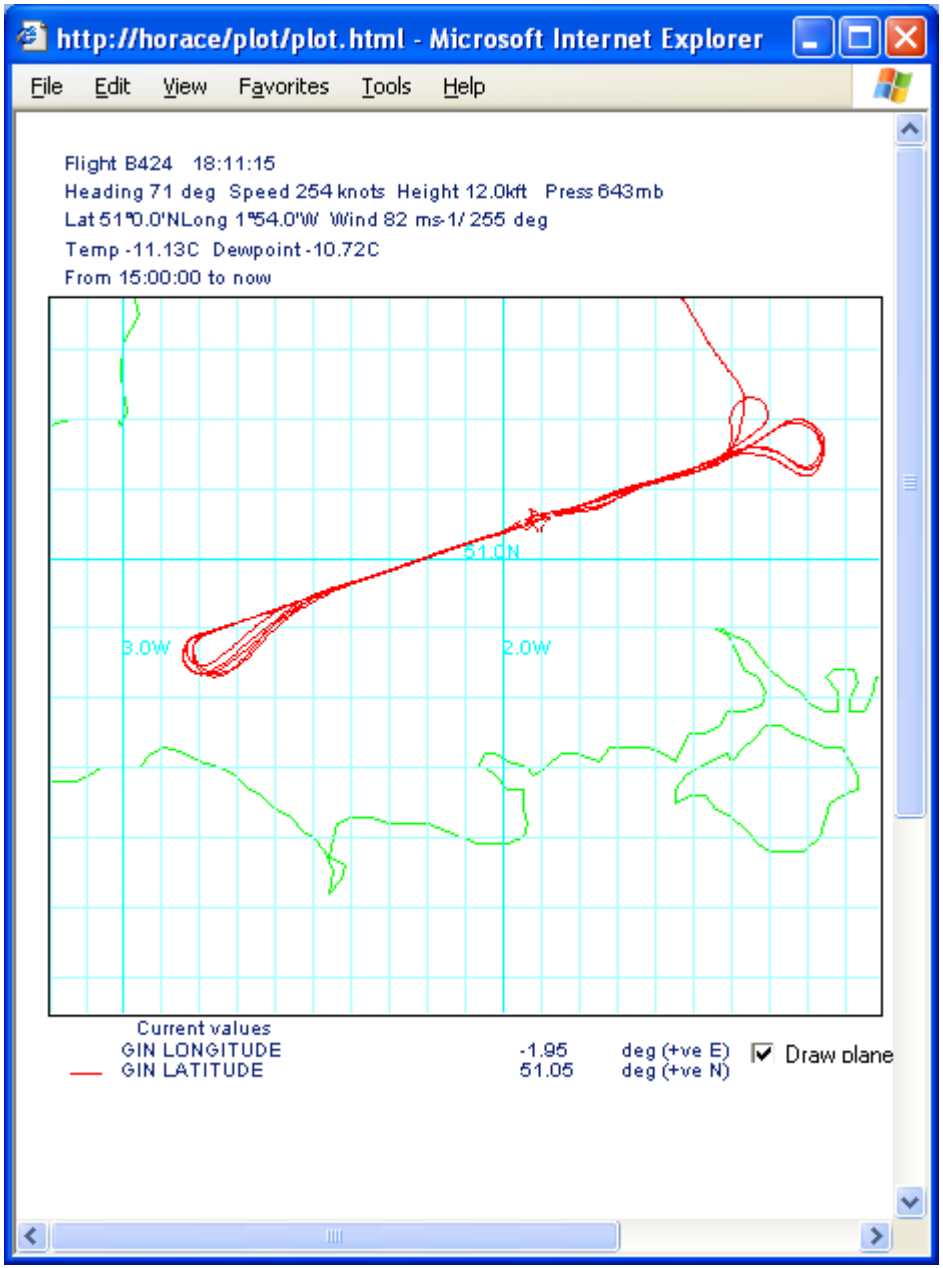
P10 rec

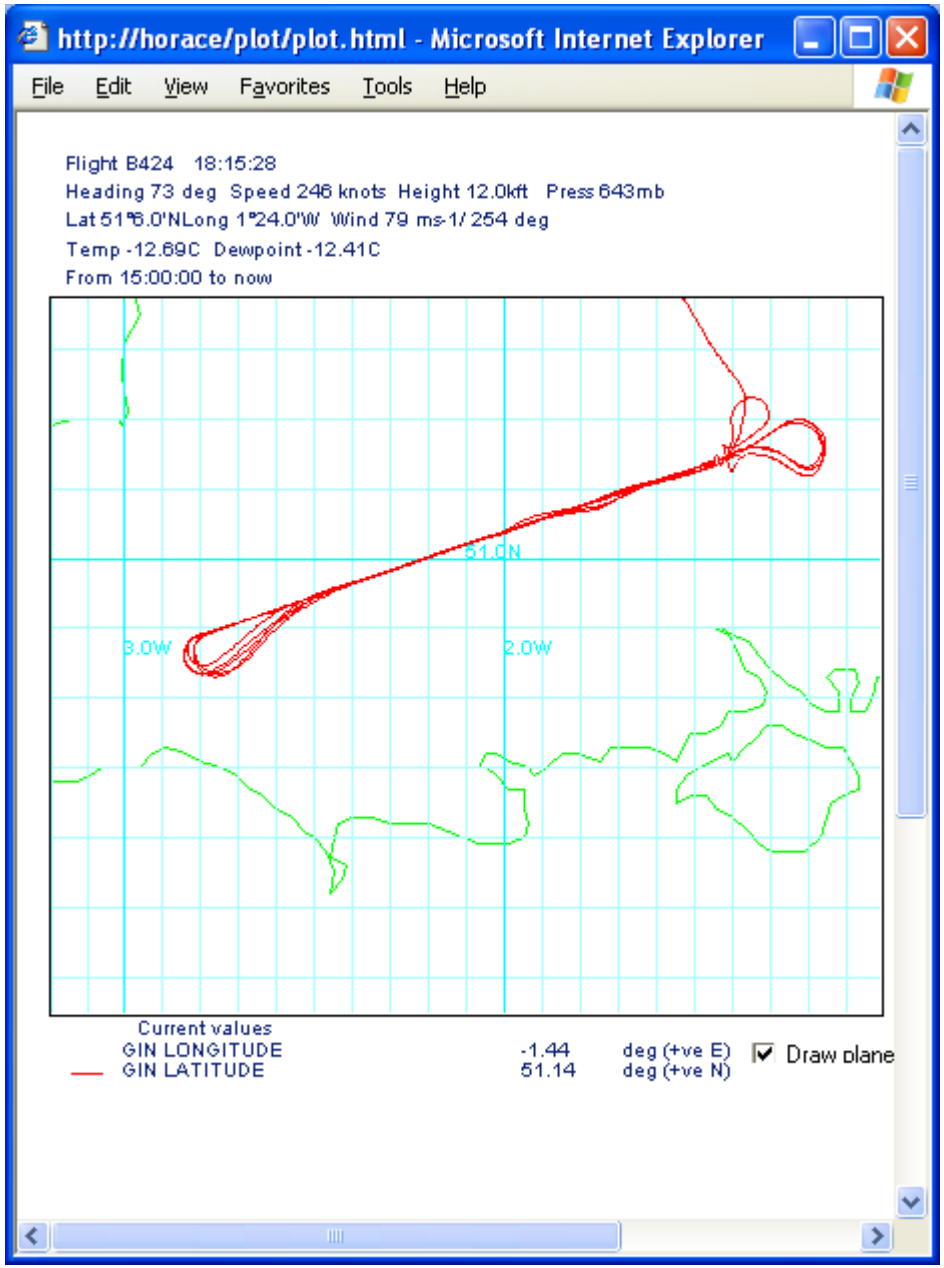




Snowflakes – “CPI”

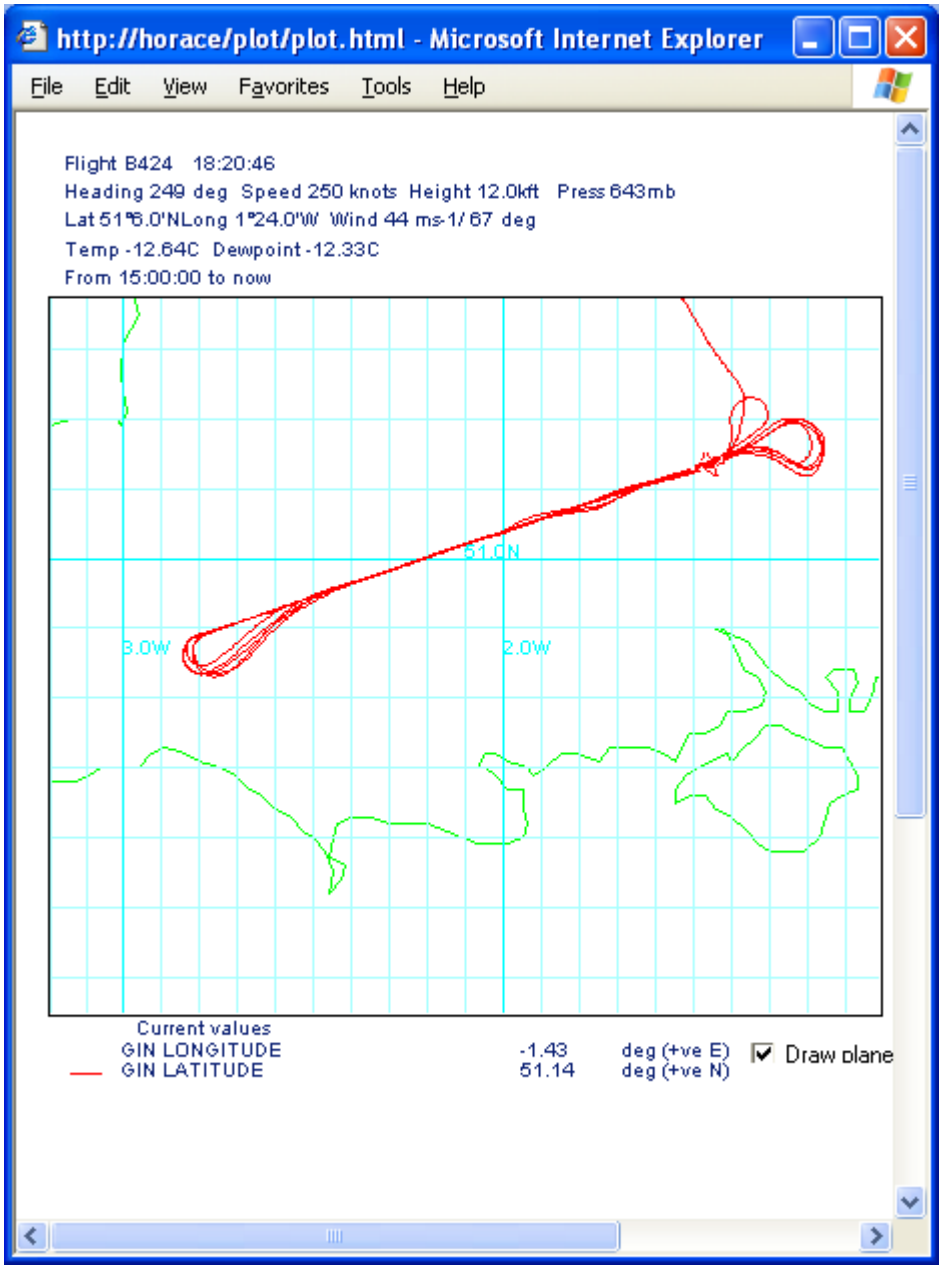
End P10 start R10

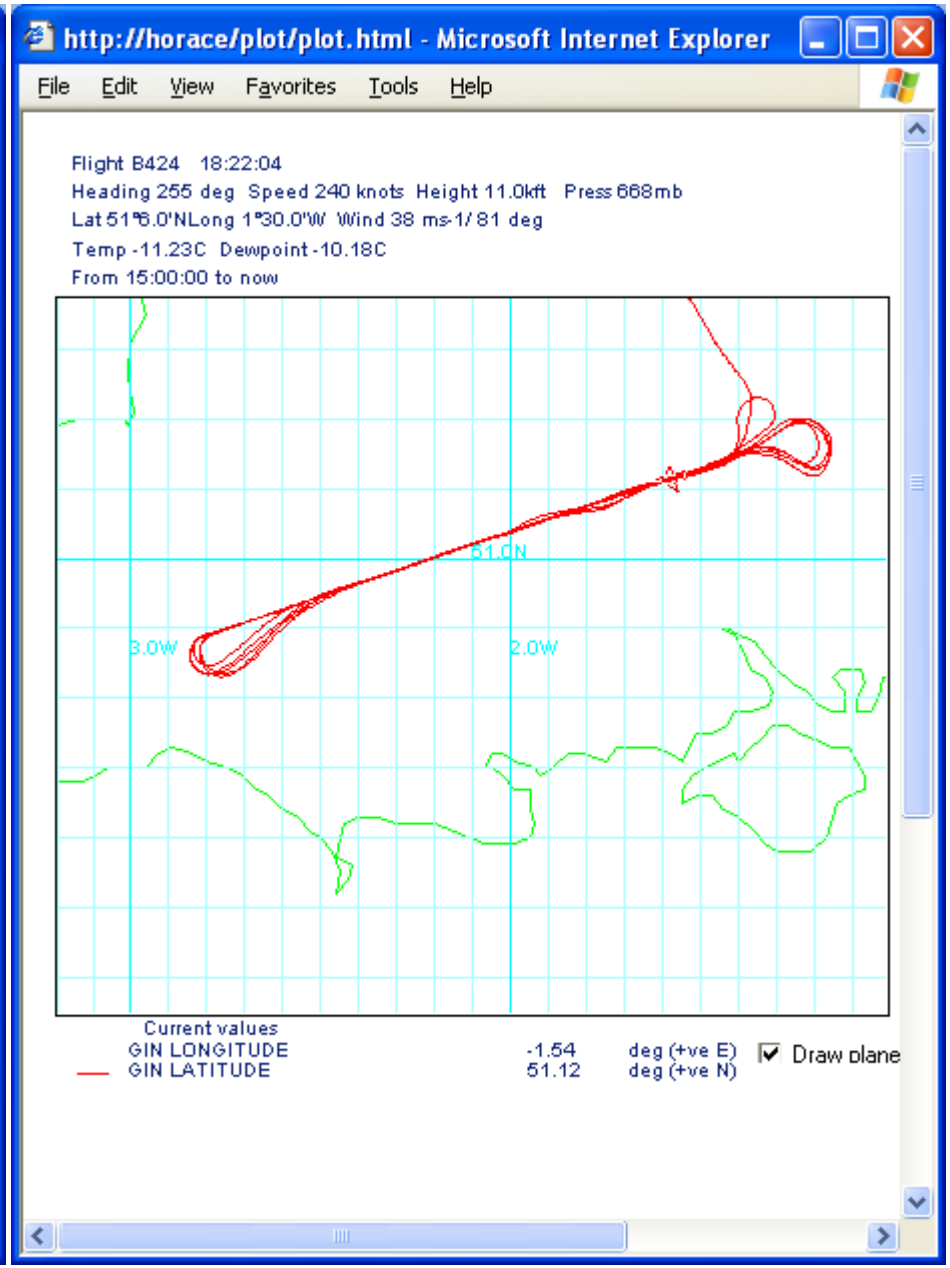




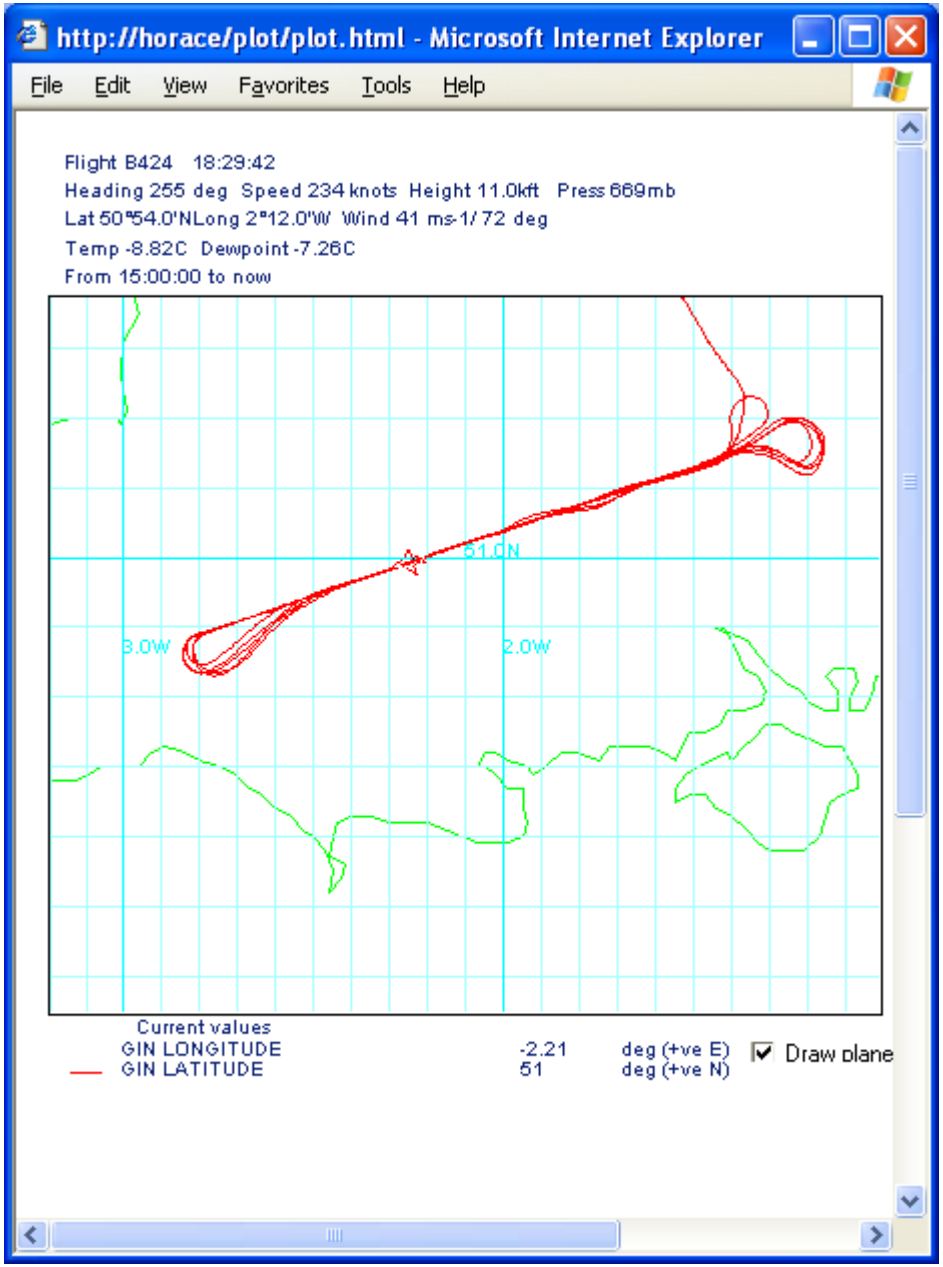
Icing detected on a/c sys

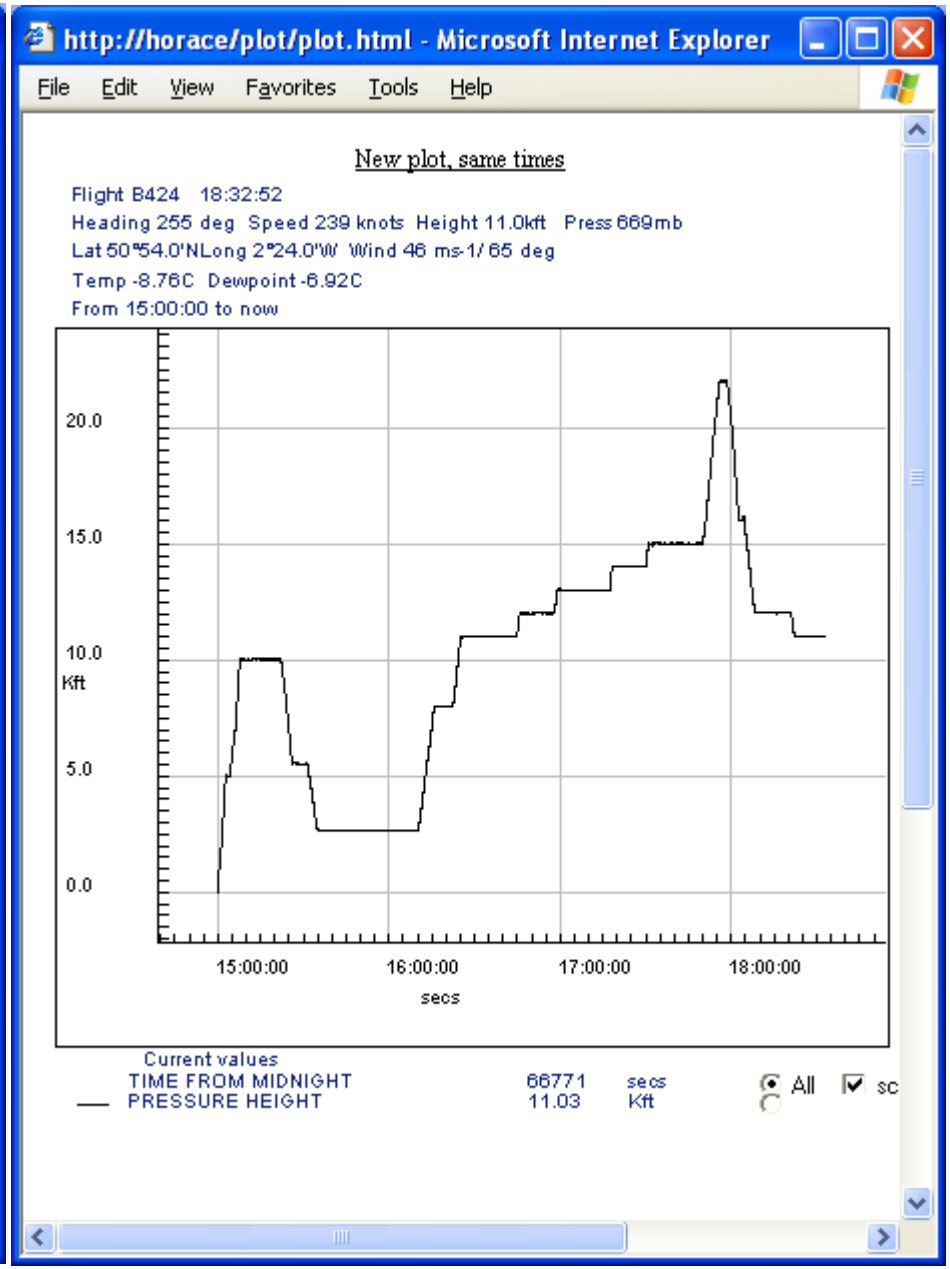
Overhead CH FL120 R10



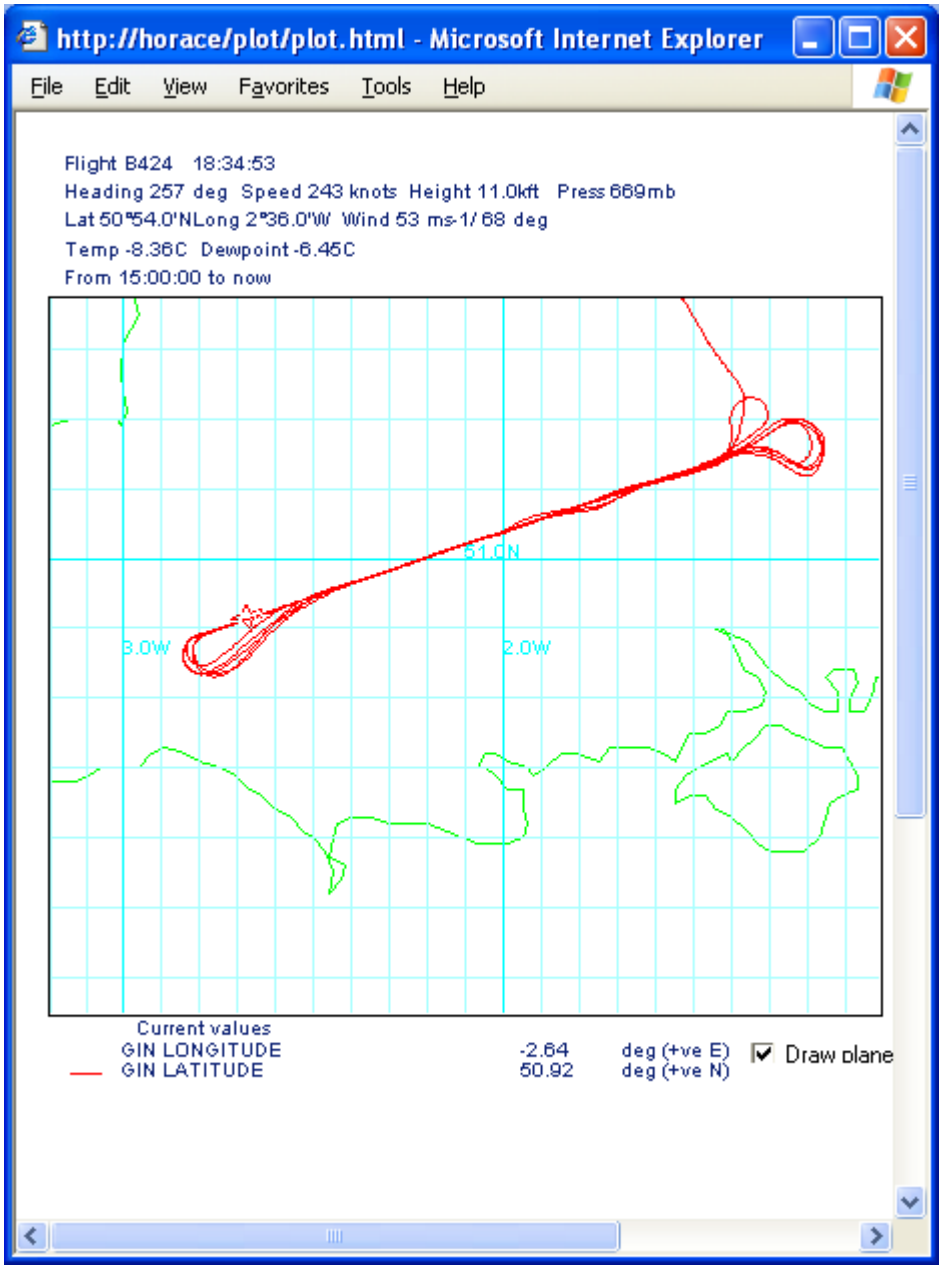


Chilbolton - end R10 start P11

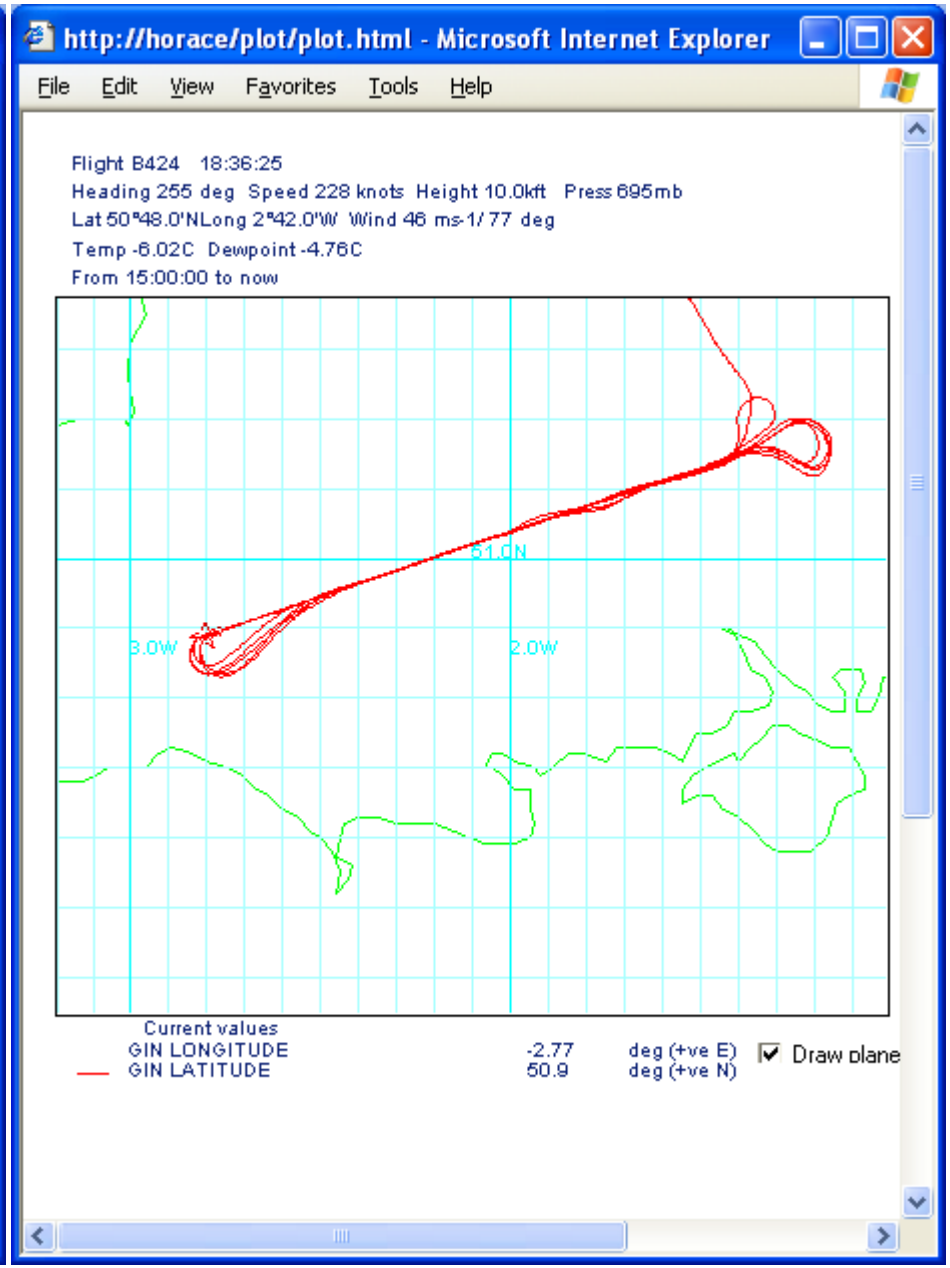




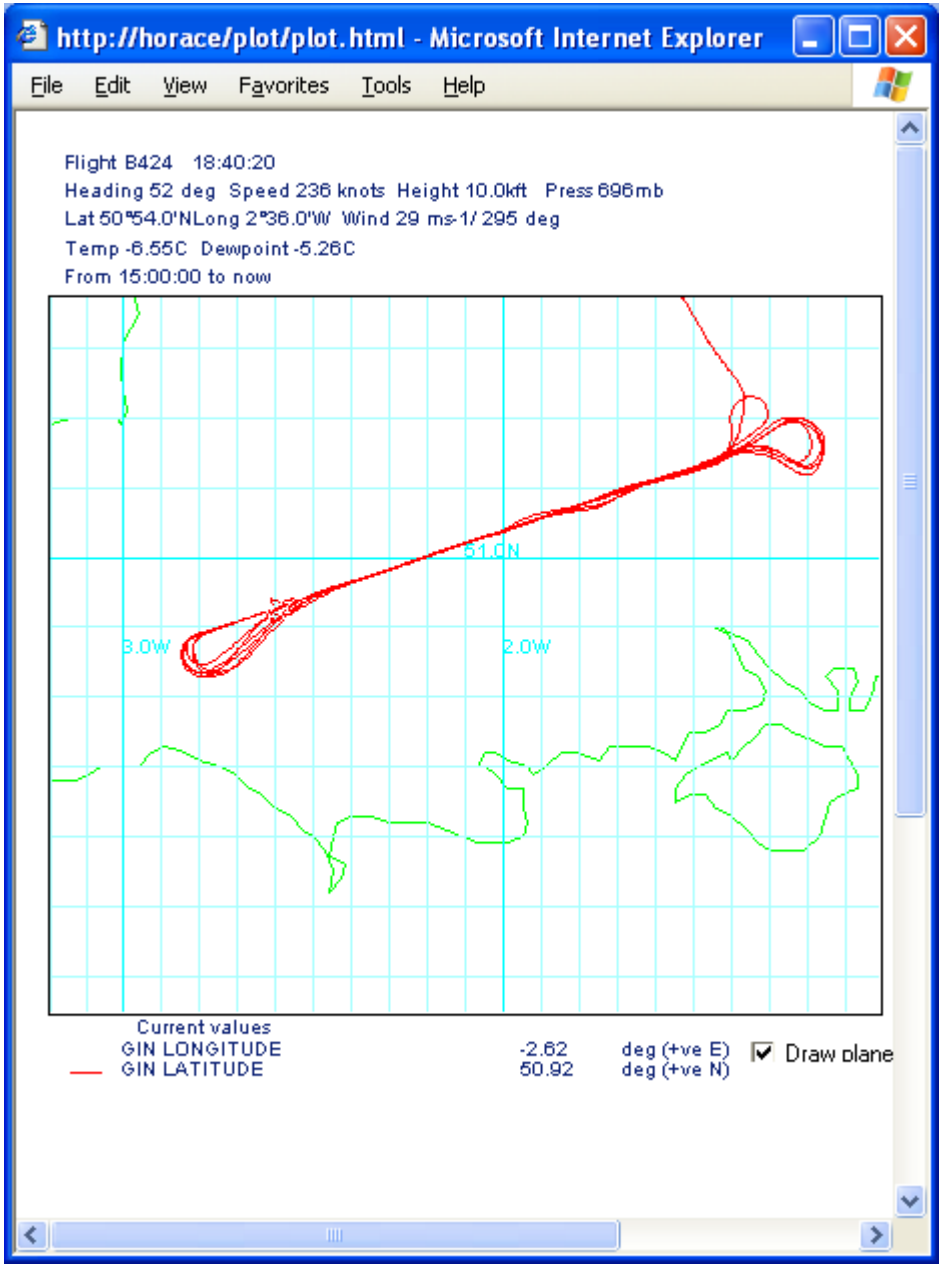
Liquid drops all m/ph + a/c antiIce



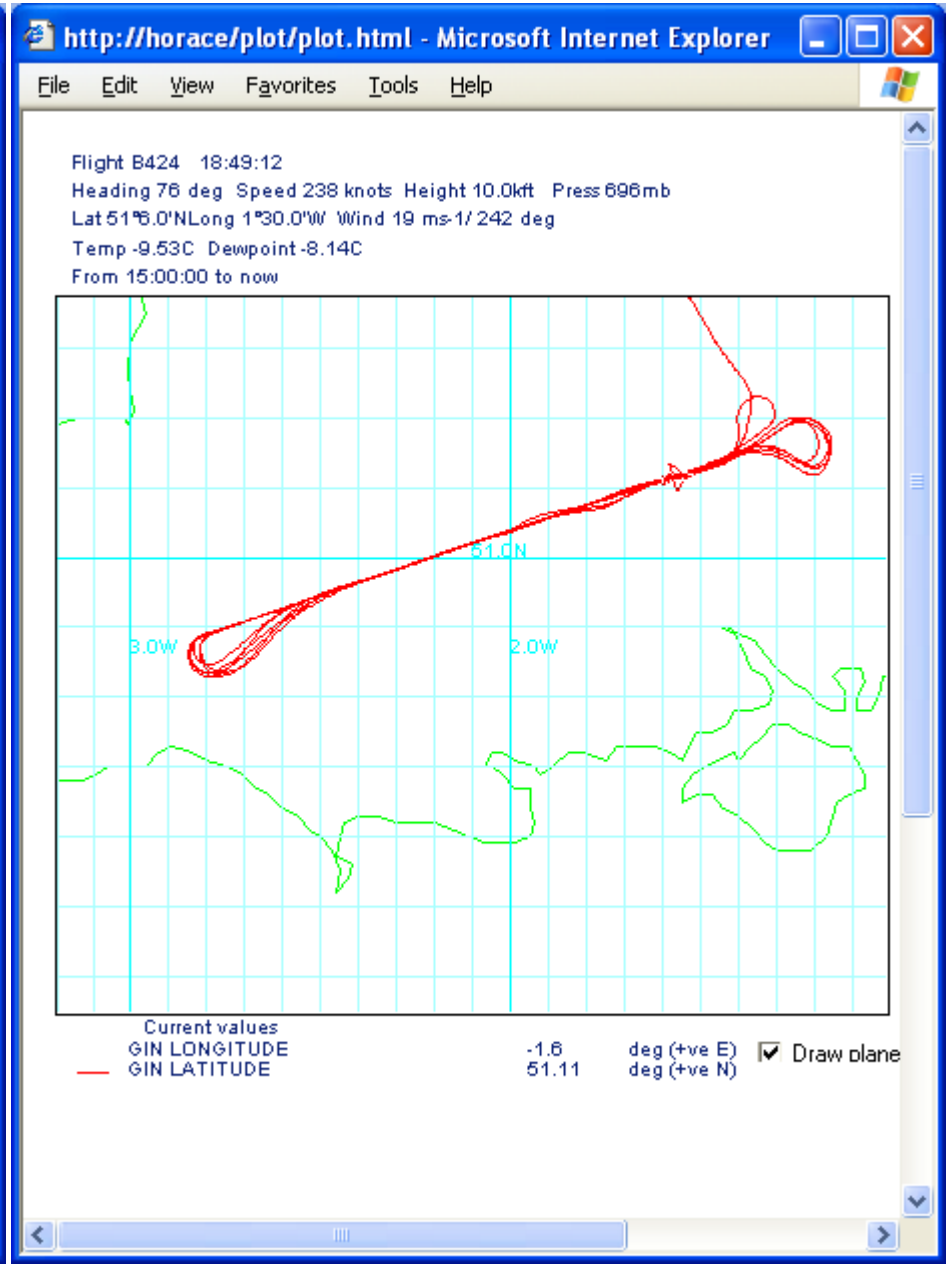
End R11 start P12



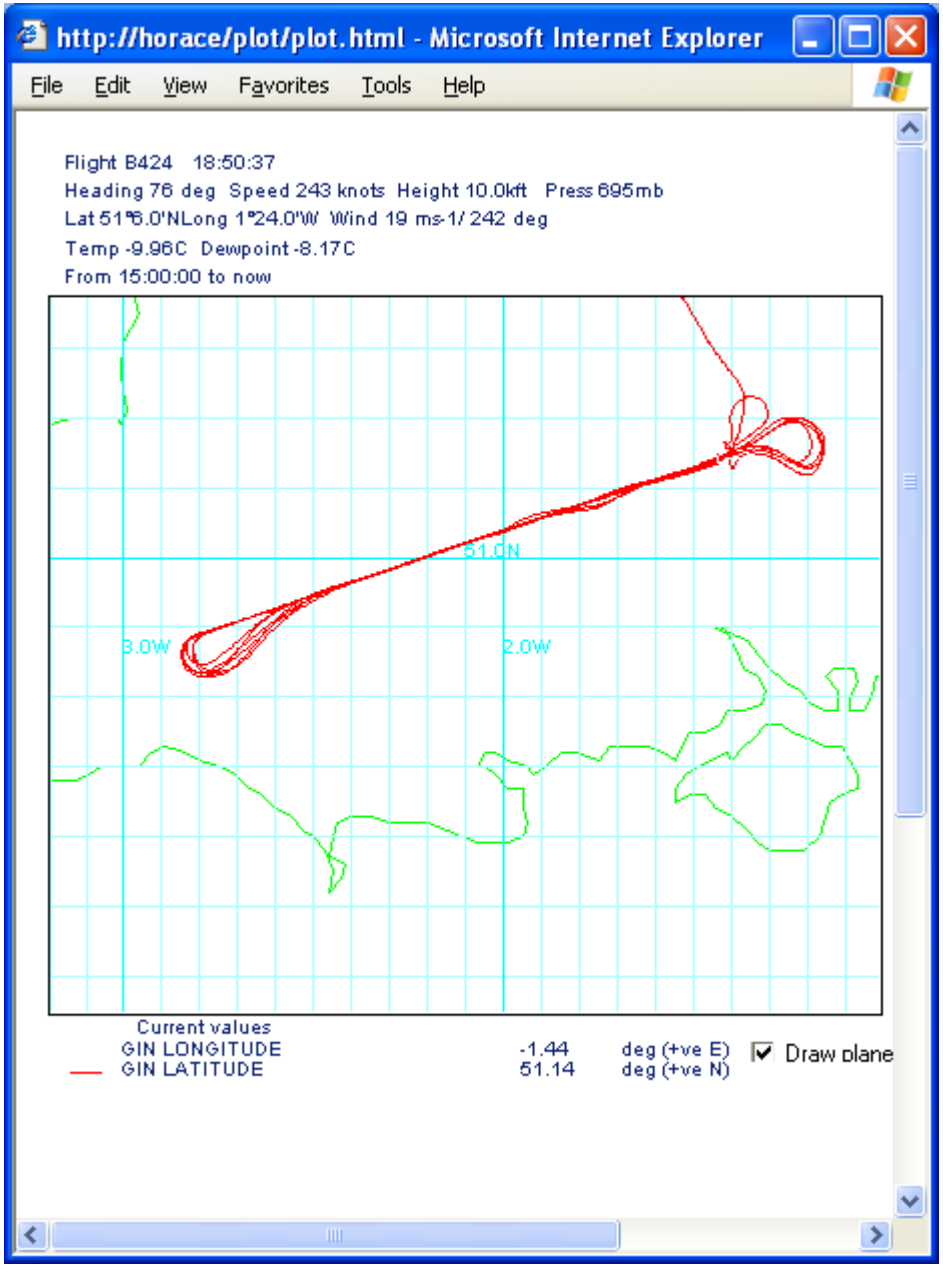
P12 end, start R12



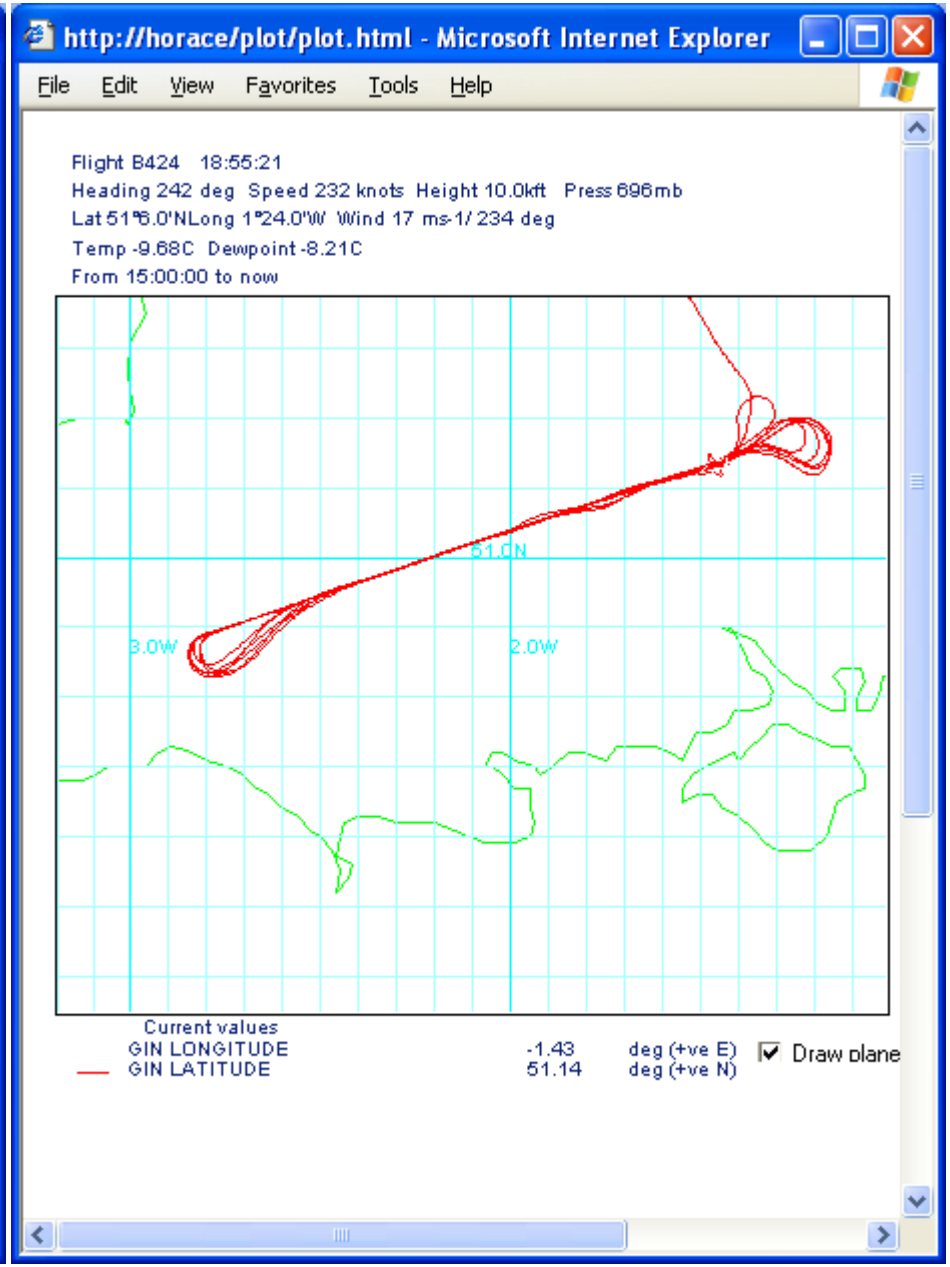
R12 SLR starts



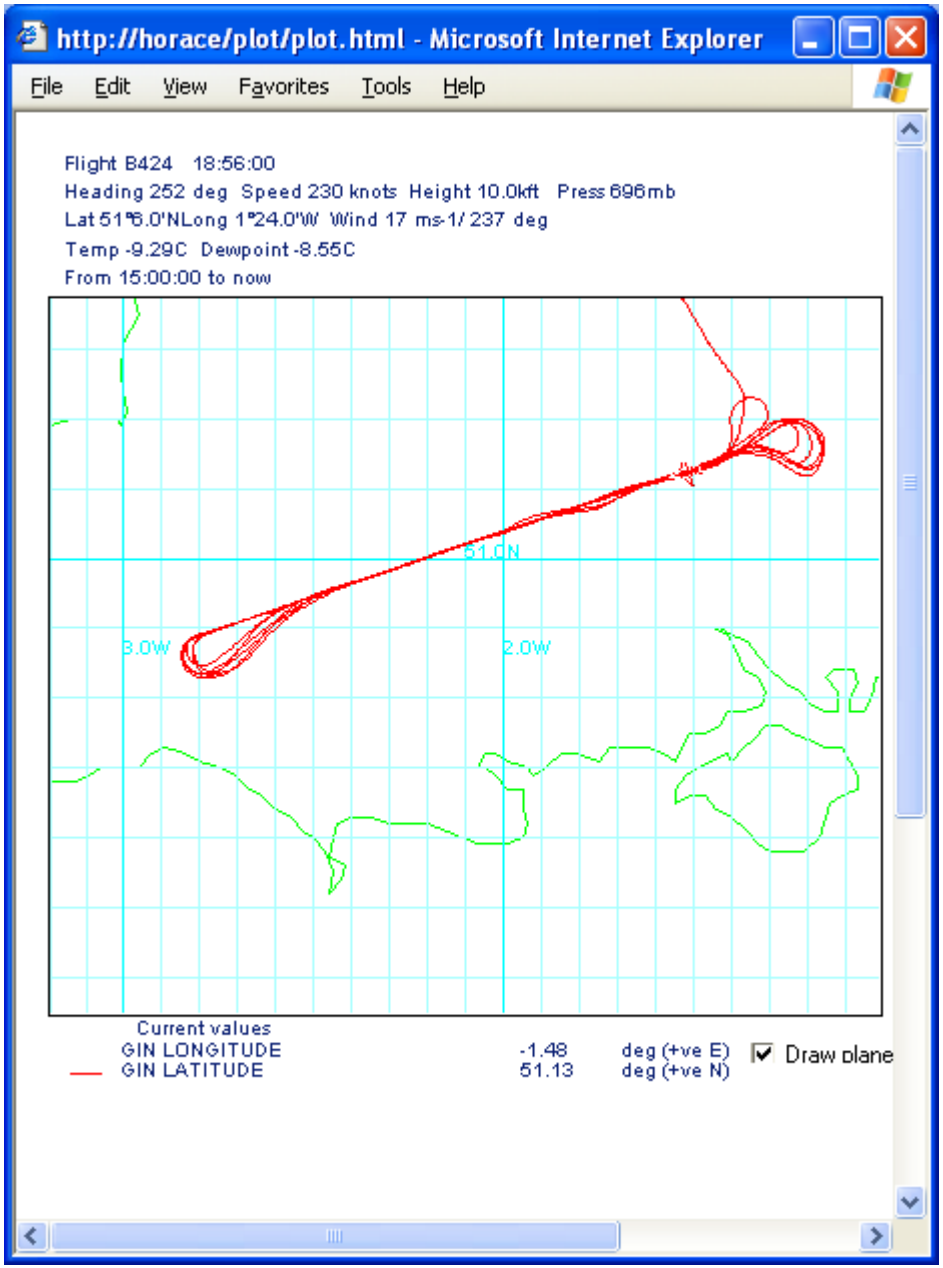
2DC snowflakes not doughnuts



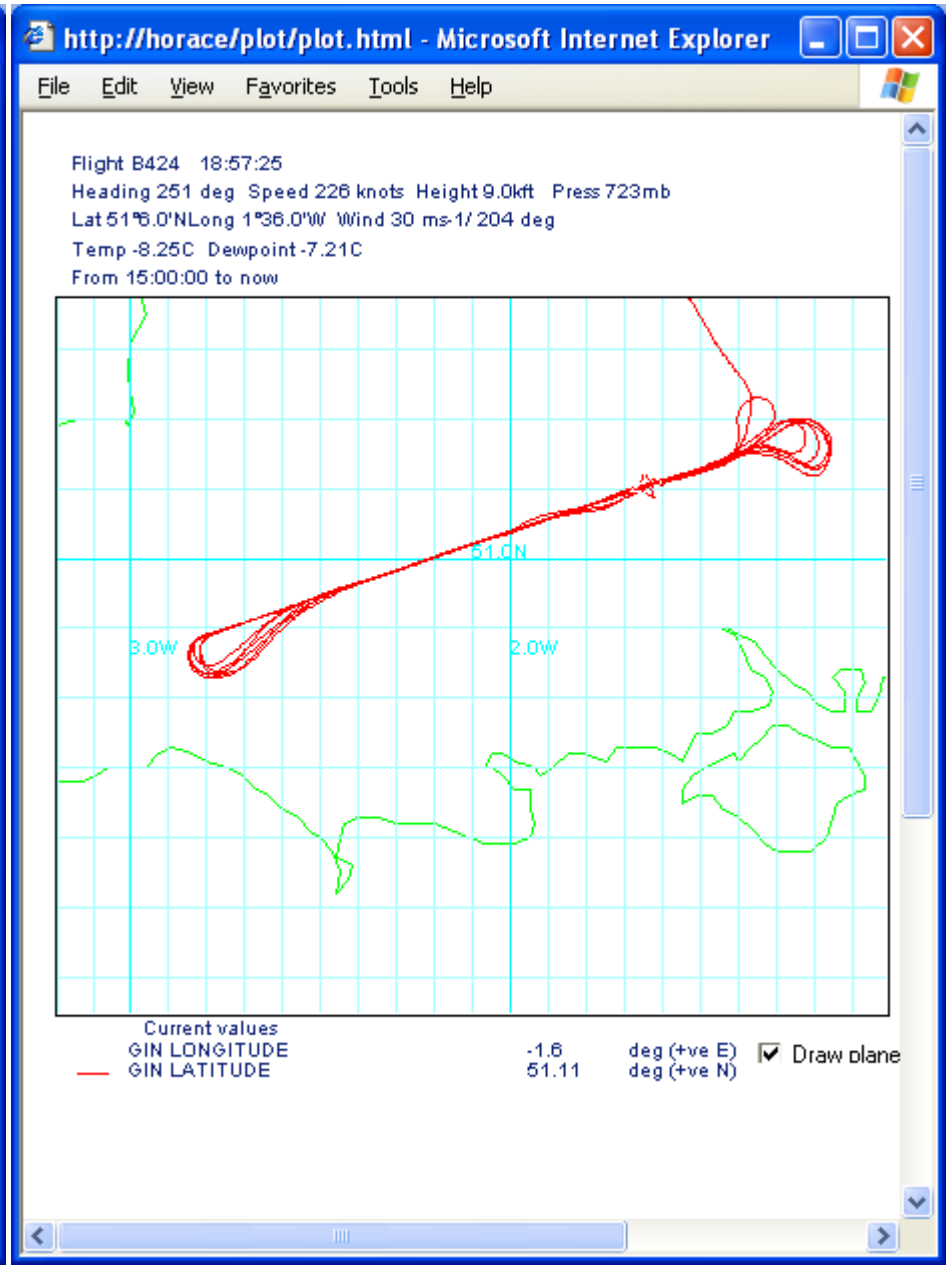
R12 over Chilbolton



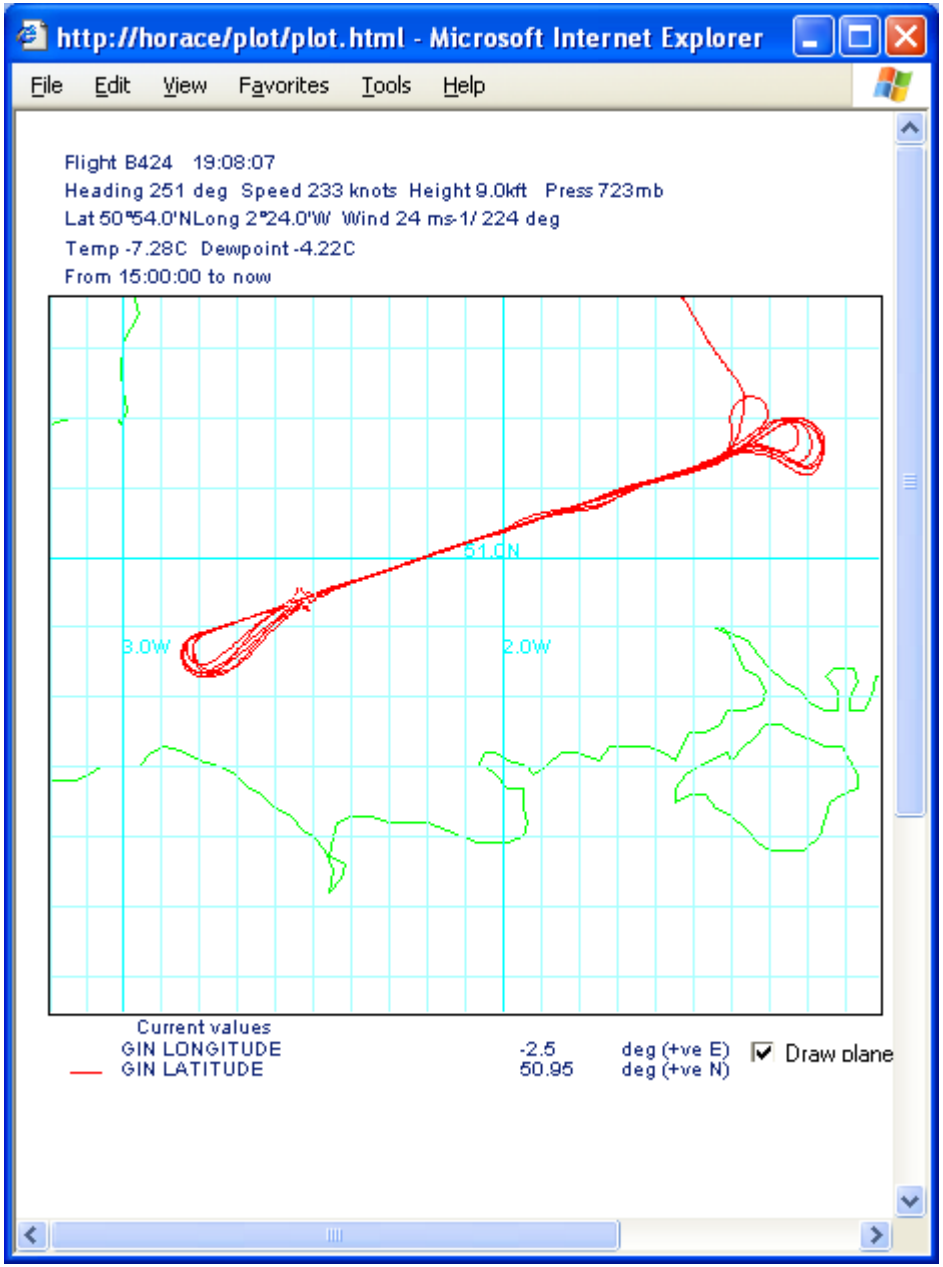
R12 over Chilbolton



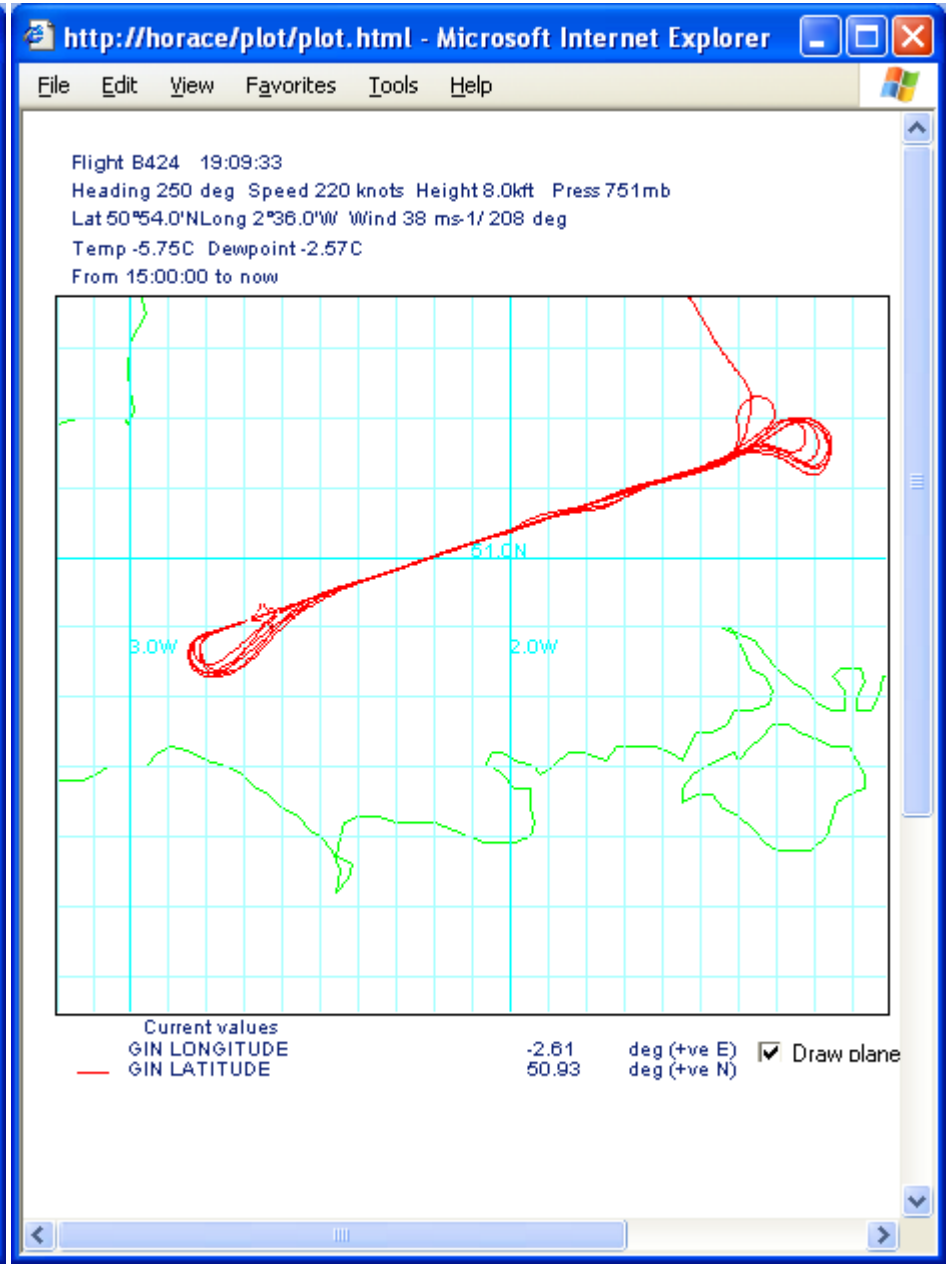
End R12 start P13



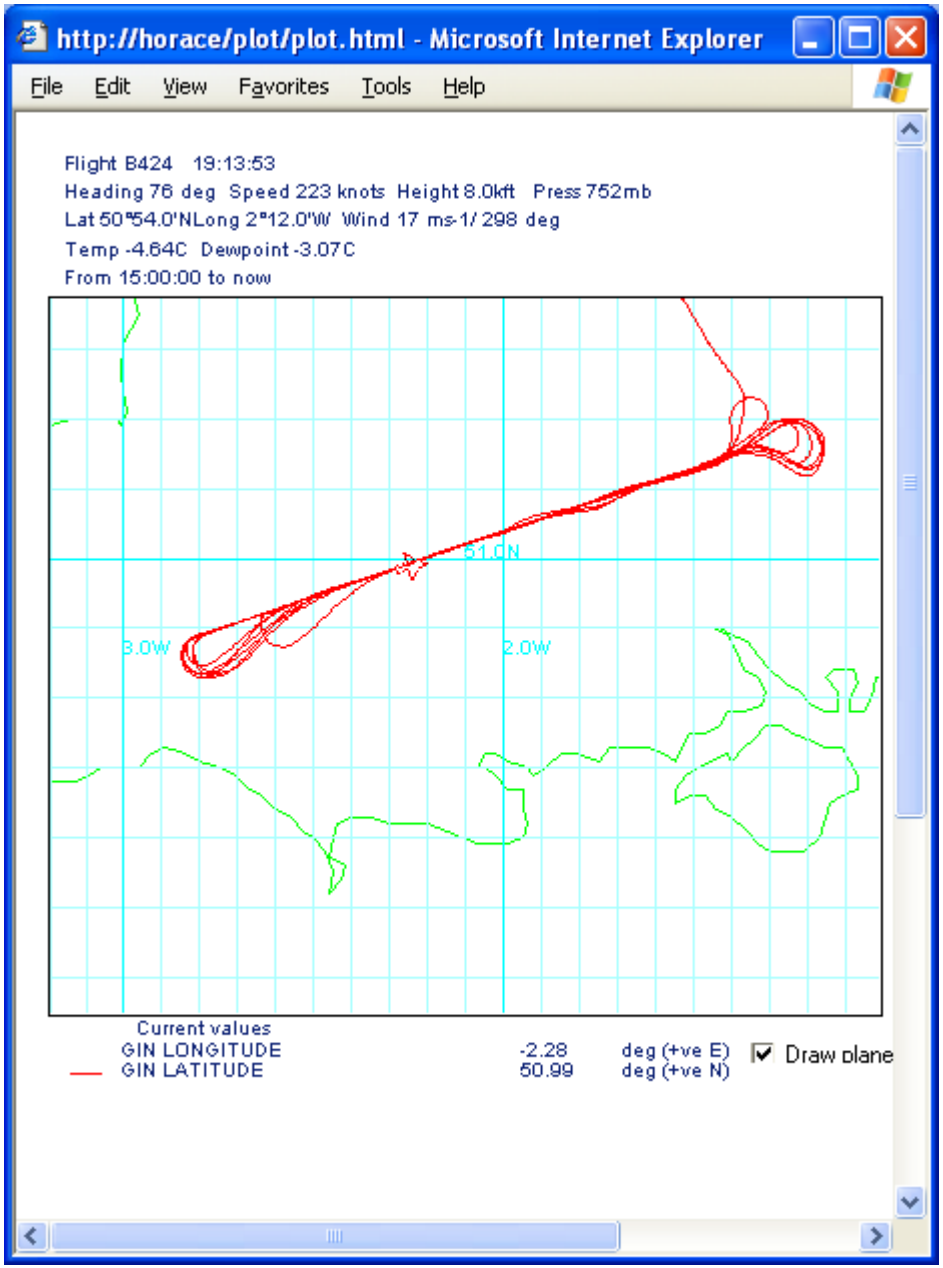
End P13 start R13

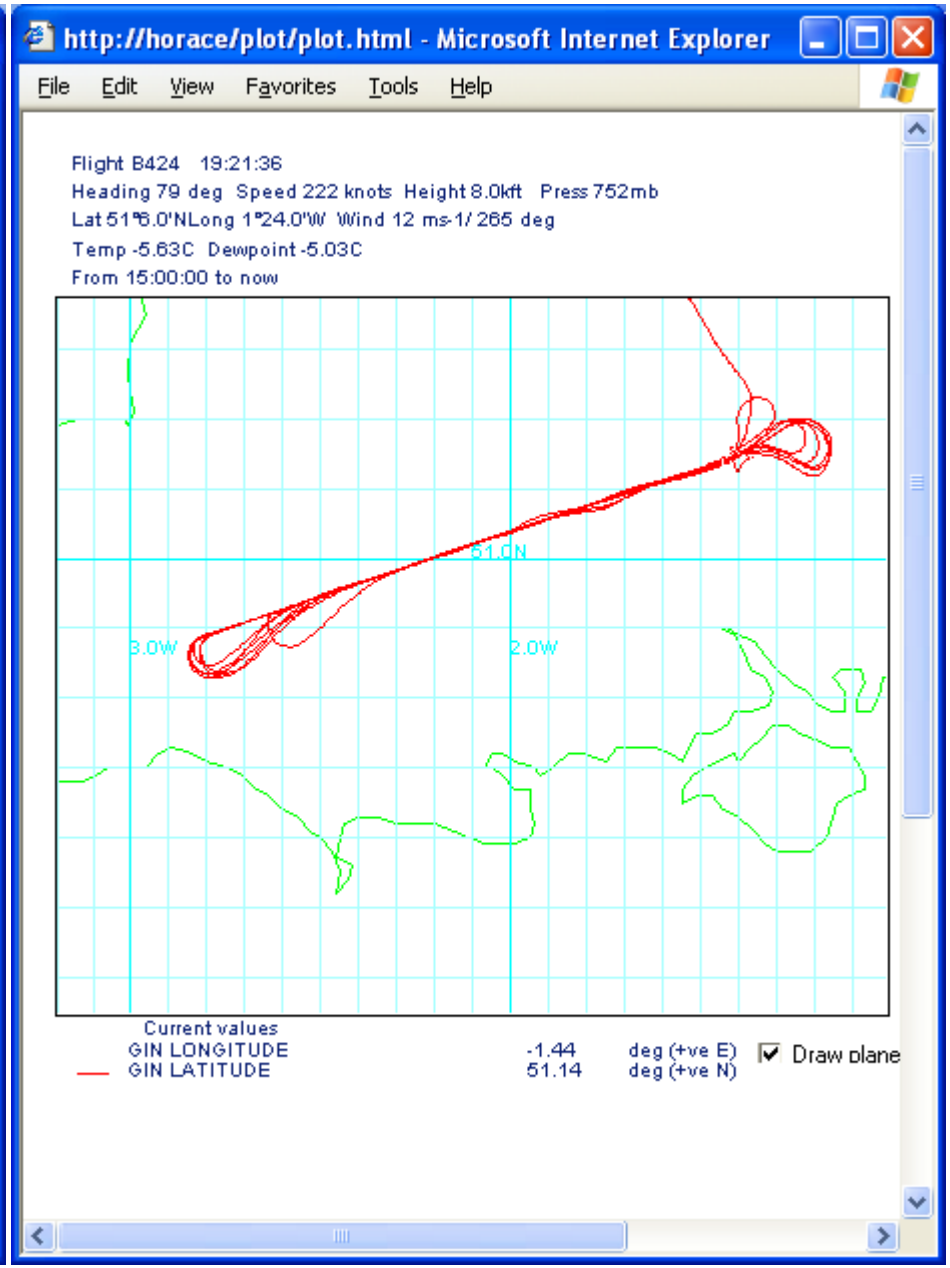


End R13 start P14



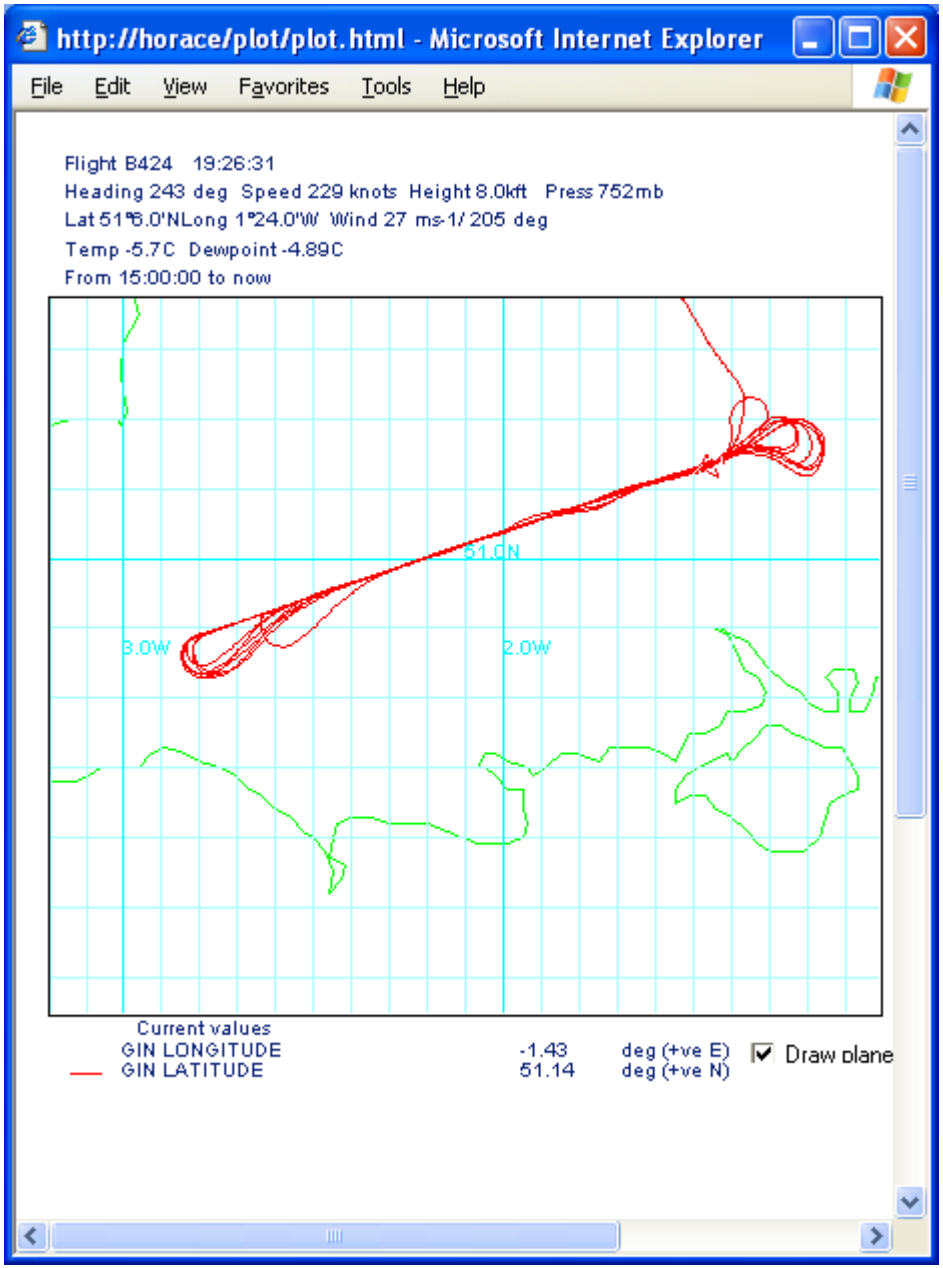
End P14 start R14

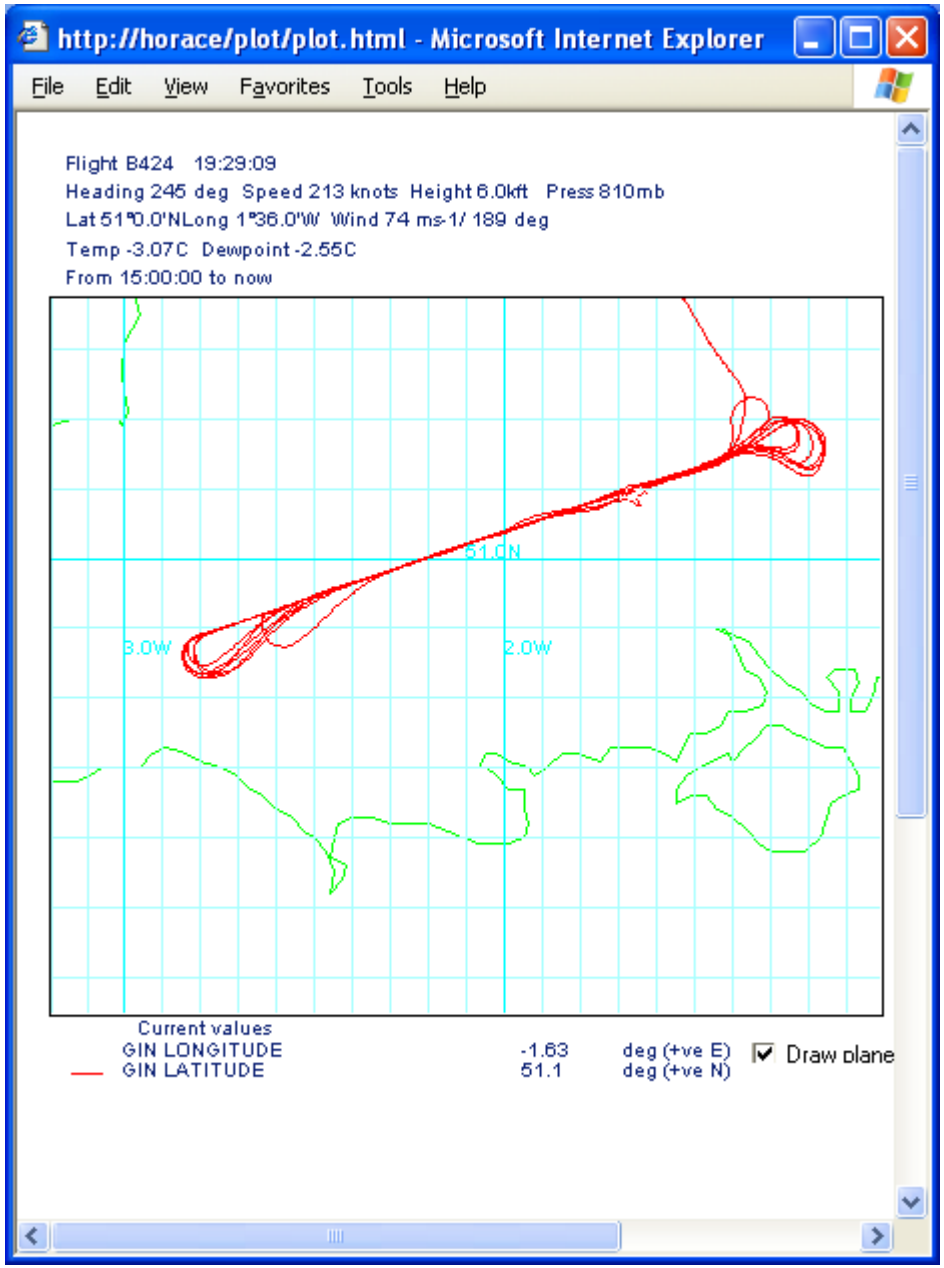




Warmer and more ice

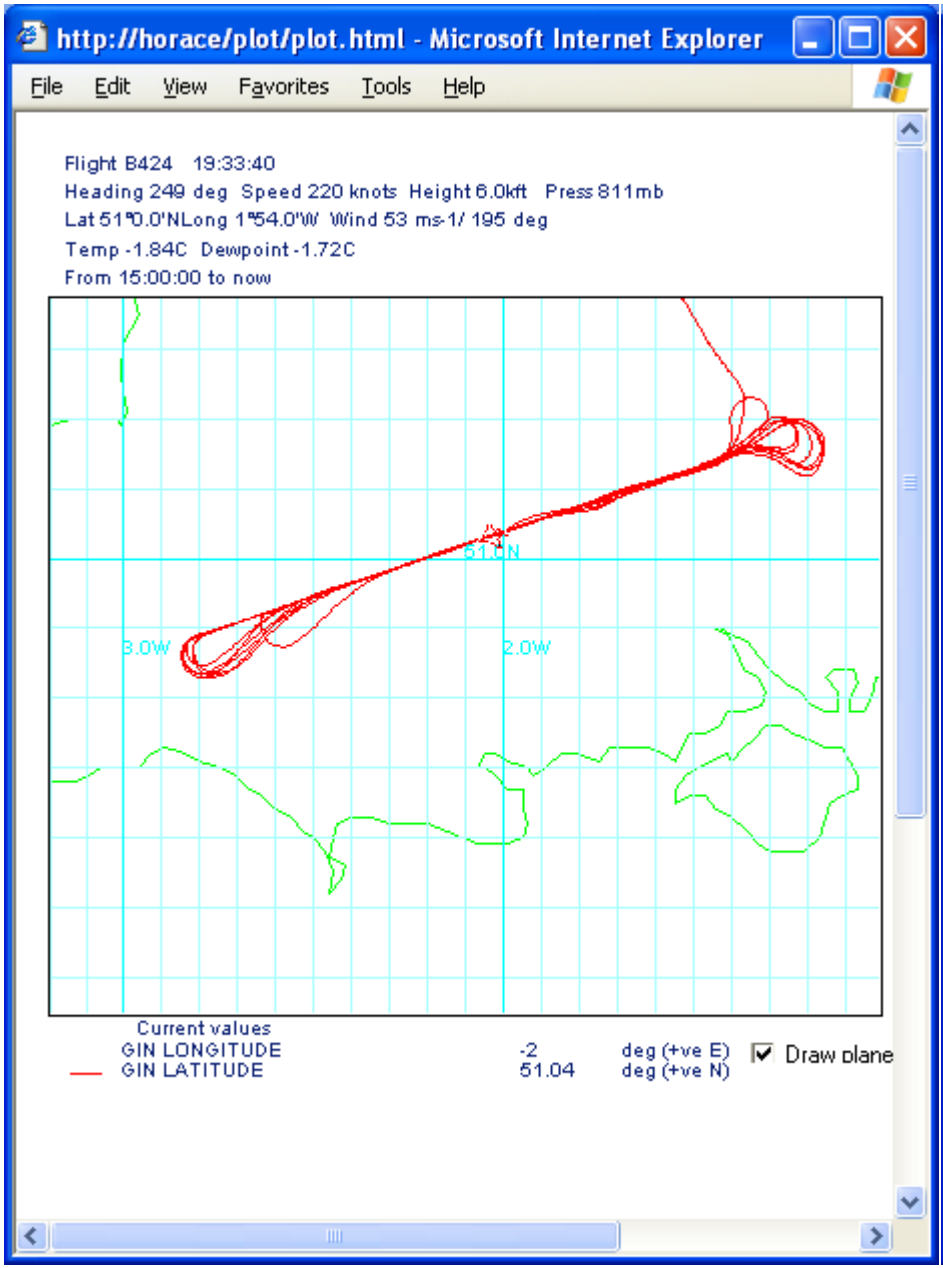
R14 over Chilbolton

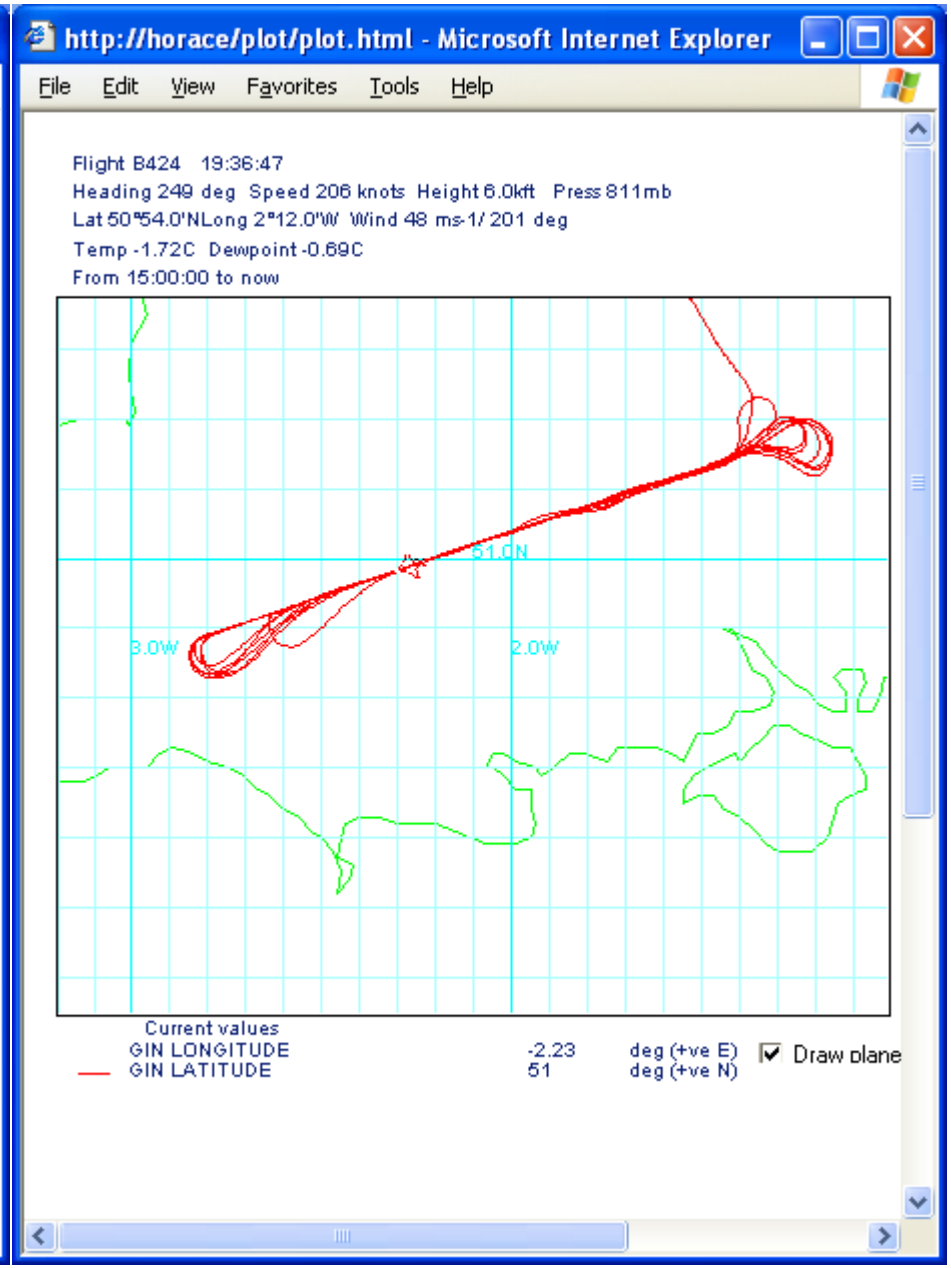




End R14 start P15 FL80 over CH

End P15 start R15 at FL60


http://horace/plot/plot.html - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Flight B424 19:33:40
Heading 249 deg Speed 220 knots Height 6.0kft Press 811mb
Lat 51°0.0'N Long 1°54.0'W Wind 53 ms-1/ 195 deg
Temp -1.84C Dewpoint -1.72C
From 15:00:00 to now
51.0N
3.0W
2.0W
Current values
GIN LONGITUDE -2 deg (+ve E) Draw plane
GIN LATITUDE 51.04 deg (+ve N)

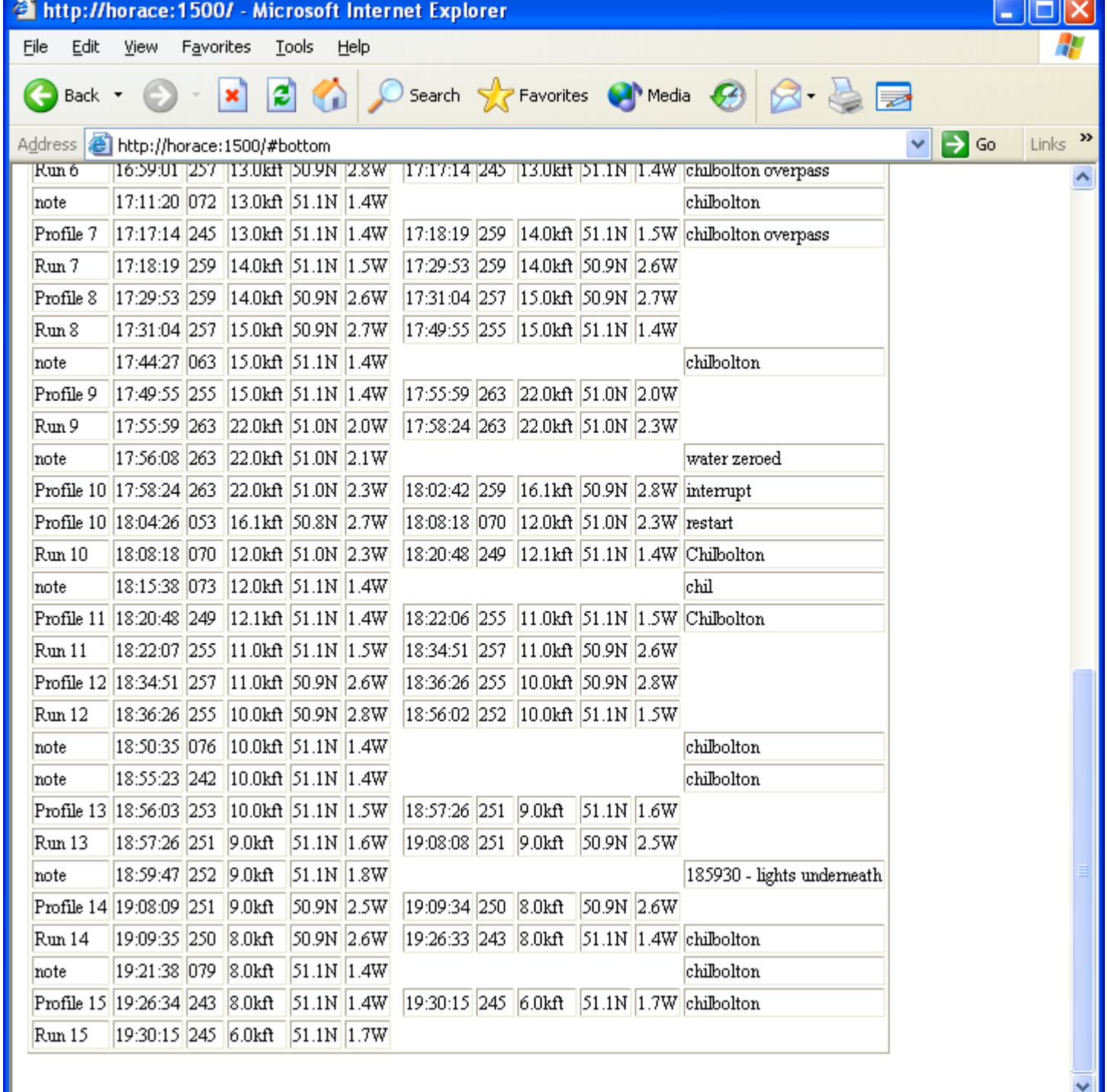

http://horace/plot/plot.html - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Flight B424 19:36:47
Heading 249 deg Speed 206 knots Height 6.0kft Press 811mb
Lat 50°54.0'N Long 2°12.0'W Wind 48 ms-1/ 201 deg
Temp -1.72C Dewpoint -0.69C
From 15:00:00 to now
51.0N
3.0W
2.0W
Current values
GIN LONGITUDE -2.23 deg (+ve E) Draw plane
GIN LATITUDE 51 deg (+ve N)

R15 FL60

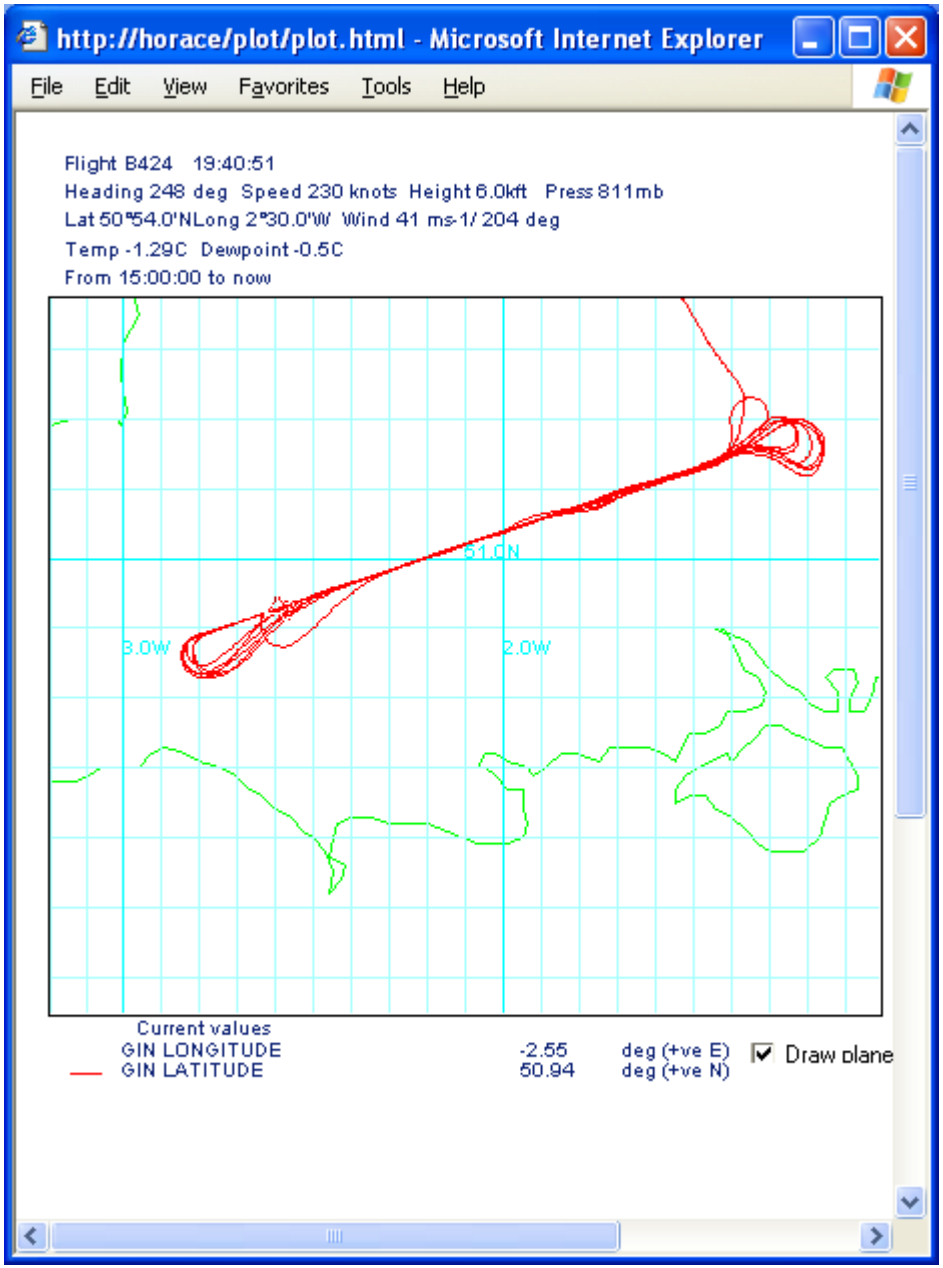
Flight Summary B424

Event	Start	Hdg	Hgt	Lat	Long	Stop	Hdg	Hgt	Lat	Long	Comment
ASP	14:54:04	050	0.68kft	52.1N	0.6W						open
T/O	15:01:29	252	2.5kft	52.0N	0.7W						15:00:10
Video	15:05:51	049	6.8kft	52.2N	0.5W						started
note	15:15:52	242	10.0kft	52.1N	1.2W						water measures zeroed
PSAP	15:21:07	235	10.0kft	52.0N	1.7W						off
Profile 1	15:21:51	169	10.0kft	51.9N	1.8W	15:26:26	171	5.6kft	51.6N	1.6W	
QNH	15:29:49	171	5.5kft	51.4N	1.6W						995
qnh	15:30:20	171	5.5kft	51.4N	1.6W						1001 disregard prev
Profile 2	15:31:12	153	5.6kft	51.4N	1.5W	15:35:04	213	2.7kft	51.2N	1.4W	
Run 1	15:35:05	213	2.7kft	51.2N	1.4W	15:51:19	247	2.7kft	50.9N	2.8W	
note	15:35:43	236	2.6kft	51.1N	1.4W						chilbolton
psap	15:38:12	250	2.7kft	51.1N	1.7W						off
psap	15:39:50	247	2.7kft	51.1N	1.8W						on
psap	15:42:59	248	2.7kft	51.0N	2.1W						off
psap	15:45:28	248	2.7kft	51.0N	2.3W						on
psap	15:47:01	248	2.7kft	51.0N	2.4W						off
note	15:52:08	151	2.7kft	50.9N	2.8W						waters zeroed
Run 2	15:52:49	065	2.7kft	50.9N	2.8W	16:05:58	077	2.7kft	51.1N	1.4W	
psap	16:04:47	081	2.7kft	51.1N	1.6W						on
note	16:05:53	077	2.7kft	51.1N	1.5W						chilbolton
note	16:06:53	350	2.7kft	51.2N	1.4W						water zeroed
Profile 3	16:10:06	233	2.6kft	51.1N	1.4W	16:15:57	252	8.0kft	51.1N	1.9W	chilbolton
psap	16:10:53	247	3.2kft	51.1N	1.5W						off
Run 3	16:15:57	252	8.0kft	51.1N	1.9W	16:23:31	252	9.2kft	50.9N	2.6W	162215
Profile 4	16:23:32	252	9.2kft	50.9N	2.6W	16:25:16	251	11.0kft	50.9N	2.8W	162215

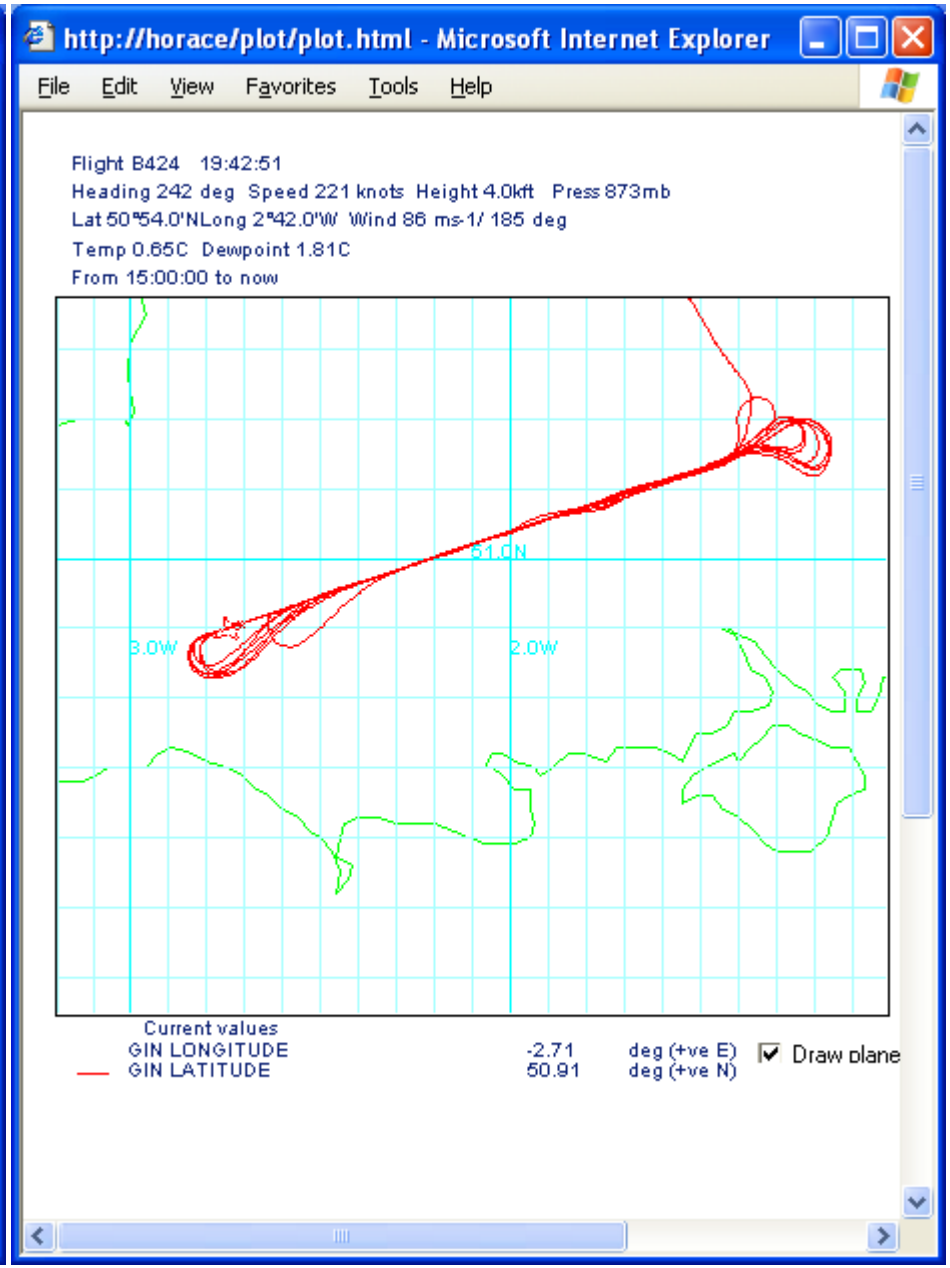
Profile 4	16:23:32	252	9.2kft	50.9N	2.6W	16:25:16	251	11.0kft	50.9N	2.8W	162215
Run 4	16:29:45	075	11.0kft	51.0N	2.5W	16:44:41	244	11.0kft	51.1N	1.4W	overhead chilbolton
note	16:38:42	073	11.0kft	51.1N	1.4W						chil
Profile 5	16:44:41	244	11.0kft	51.1N	1.4W	16:45:55	258	12.0kft	51.1N	1.6W	overhead chilbolton
Run 5	16:45:55	258	12.0kft	51.1N	1.6W	16:57:54	255	12.0kft	50.9N	2.7W	
Profile 6	16:57:54	255	12.0kft	50.9N	2.7W	16:59:00	257	13.0kft	50.9N	2.8W	
Run 6	16:59:01	257	13.0kft	50.9N	2.8W	17:17:14	245	13.0kft	51.1N	1.4W	chilbolton overpass
note	17:11:20	072	13.0kft	51.1N	1.4W						chilbolton
Profile 7	17:17:14	245	13.0kft	51.1N	1.4W	17:18:19	259	14.0kft	51.1N	1.5W	chilbolton overpass
Run 7	17:18:19	259	14.0kft	51.1N	1.5W	17:29:53	259	14.0kft	50.9N	2.6W	
Profile 8	17:29:53	259	14.0kft	50.9N	2.6W	17:31:04	257	15.0kft	50.9N	2.7W	
Run 8	17:31:04	257	15.0kft	50.9N	2.7W	17:49:55	255	15.0kft	51.1N	1.4W	
note	17:44:27	063	15.0kft	51.1N	1.4W						chilbolton
Profile 9	17:49:55	255	15.0kft	51.1N	1.4W	17:55:59	263	22.0kft	51.0N	2.0W	
Run 9	17:55:59	263	22.0kft	51.0N	2.0W	17:58:24	263	22.0kft	51.0N	2.3W	
note	17:56:08	263	22.0kft	51.0N	2.1W						water zeroed
Profile 10	17:58:24	263	22.0kft	51.0N	2.3W	18:02:42	259	16.1kft	50.9N	2.8W	interrupt
Profile 10	18:04:26	053	16.1kft	50.8N	2.7W	18:08:18	070	12.0kft	51.0N	2.3W	restart
Run 10	18:08:18	070	12.0kft	51.0N	2.3W	18:20:48	249	12.1kft	51.1N	1.4W	Chilbolton
note	18:15:38	073	12.0kft	51.1N	1.4W						chil
Profile 11	18:20:48	249	12.1kft	51.1N	1.4W	18:22:06	255	11.0kft	51.1N	1.5W	Chilbolton
Run 11	18:22:07	255	11.0kft	51.1N	1.5W	18:34:51	257	11.0kft	50.9N	2.6W	
Profile 12	18:34:51	257	11.0kft	50.9N	2.6W	18:36:26	255	10.0kft	50.9N	2.8W	
Run 12	18:36:26	255	10.0kft	50.9N	2.8W	18:56:02	252	10.0kft	51.1N	1.5W	
note	18:50:35	076	10.0kft	51.1N	1.4W						chilbolton
note	18:55:23	242	10.0kft	51.1N	1.4W						chilbolton
Profile 13	18:56:03	253	10.0kft	51.1N	1.5W	18:57:26	251	9.0kft	51.1N	1.6W	
Run 13	18:57:26	251	9.0kft	51.1N	1.6W	19:08:08	251	9.0kft	50.9N	2.5W	
note	18:59:47	252	9.0kft	51.1N	1.8W						185930 - lights underneath



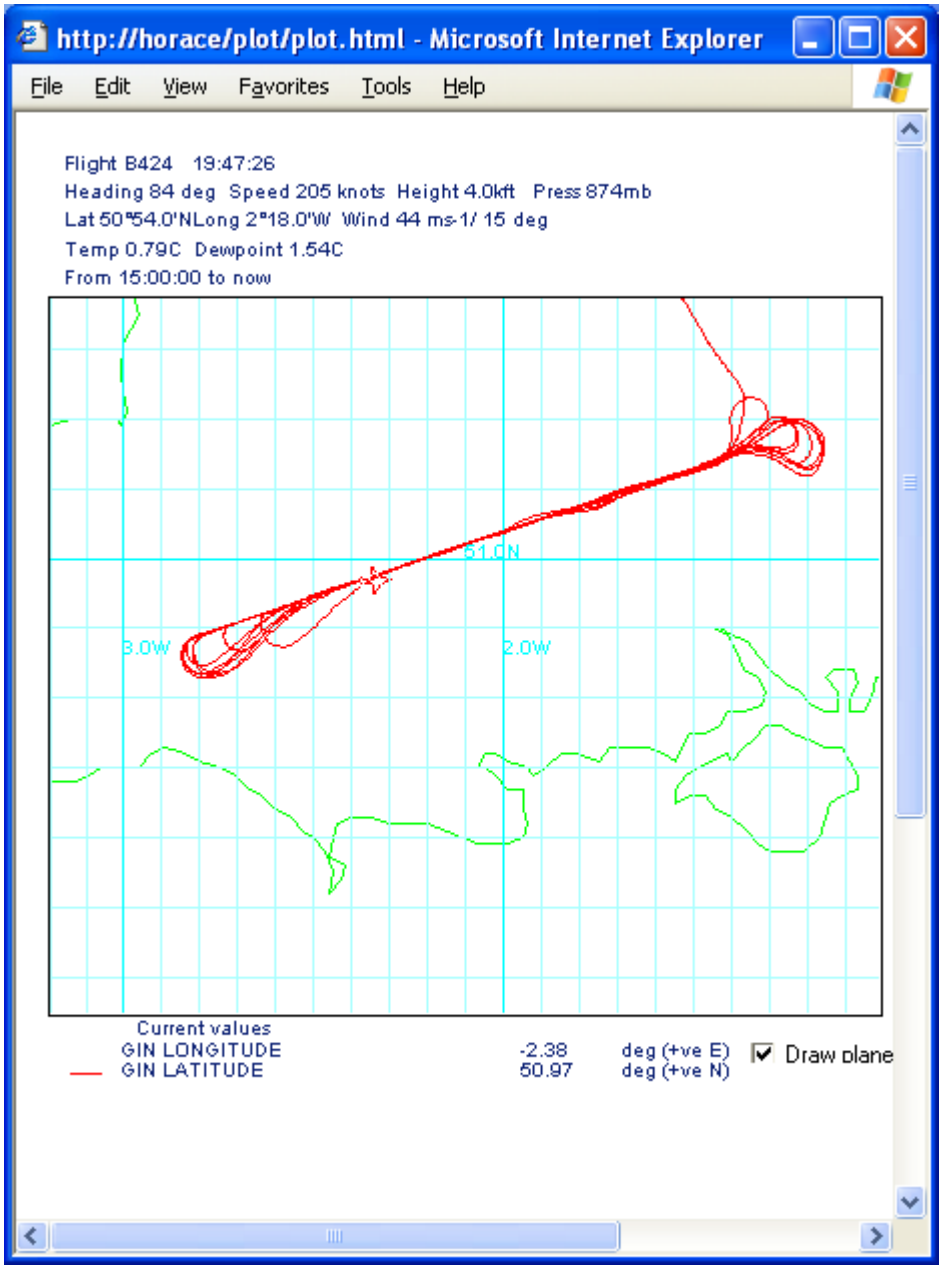
Run 6	16:59:01	257	13.0kft	50.9N	2.8W	17:17:14	245	13.0kft	51.1N	1.4W	chilbolton overpass
note	17:11:20	072	13.0kft	51.1N	1.4W						chilbolton
Profile 7	17:17:14	245	13.0kft	51.1N	1.4W	17:18:19	259	14.0kft	51.1N	1.5W	chilbolton overpass
Run 7	17:18:19	259	14.0kft	51.1N	1.5W	17:29:53	259	14.0kft	50.9N	2.6W	
Profile 8	17:29:53	259	14.0kft	50.9N	2.6W	17:31:04	257	15.0kft	50.9N	2.7W	
Run 8	17:31:04	257	15.0kft	50.9N	2.7W	17:49:55	255	15.0kft	51.1N	1.4W	
note	17:44:27	063	15.0kft	51.1N	1.4W						chilbolton
Profile 9	17:49:55	255	15.0kft	51.1N	1.4W	17:55:59	263	22.0kft	51.0N	2.0W	
Run 9	17:55:59	263	22.0kft	51.0N	2.0W	17:58:24	263	22.0kft	51.0N	2.3W	
note	17:56:08	263	22.0kft	51.0N	2.1W						water zeroed
Profile 10	17:58:24	263	22.0kft	51.0N	2.3W	18:02:42	259	16.1kft	50.9N	2.8W	interrupt
Profile 10	18:04:26	053	16.1kft	50.8N	2.7W	18:08:18	070	12.0kft	51.0N	2.3W	restart
Run 10	18:08:18	070	12.0kft	51.0N	2.3W	18:20:48	249	12.1kft	51.1N	1.4W	Chilbolton
note	18:15:38	073	12.0kft	51.1N	1.4W						chil
Profile 11	18:20:48	249	12.1kft	51.1N	1.4W	18:22:06	255	11.0kft	51.1N	1.5W	Chilbolton
Run 11	18:22:07	255	11.0kft	51.1N	1.5W	18:34:51	257	11.0kft	50.9N	2.6W	
Profile 12	18:34:51	257	11.0kft	50.9N	2.6W	18:36:26	255	10.0kft	50.9N	2.8W	
Run 12	18:36:26	255	10.0kft	50.9N	2.8W	18:56:02	252	10.0kft	51.1N	1.5W	
note	18:50:35	076	10.0kft	51.1N	1.4W						chilbolton
note	18:55:23	242	10.0kft	51.1N	1.4W						chilbolton
Profile 13	18:56:03	253	10.0kft	51.1N	1.5W	18:57:26	251	9.0kft	51.1N	1.6W	
Run 13	18:57:26	251	9.0kft	51.1N	1.6W	19:08:08	251	9.0kft	50.9N	2.5W	
note	18:59:47	252	9.0kft	51.1N	1.8W						185930 - lights underneath
Profile 14	19:08:09	251	9.0kft	50.9N	2.5W	19:09:34	250	8.0kft	50.9N	2.6W	
Run 14	19:09:35	250	8.0kft	50.9N	2.6W	19:26:33	243	8.0kft	51.1N	1.4W	chilbolton
note	19:21:38	079	8.0kft	51.1N	1.4W						chilbolton
Profile 15	19:26:34	243	8.0kft	51.1N	1.4W	19:30:15	245	6.0kft	51.1N	1.7W	chilbolton
Run 15	19:30:15	245	6.0kft	51.1N	1.7W						

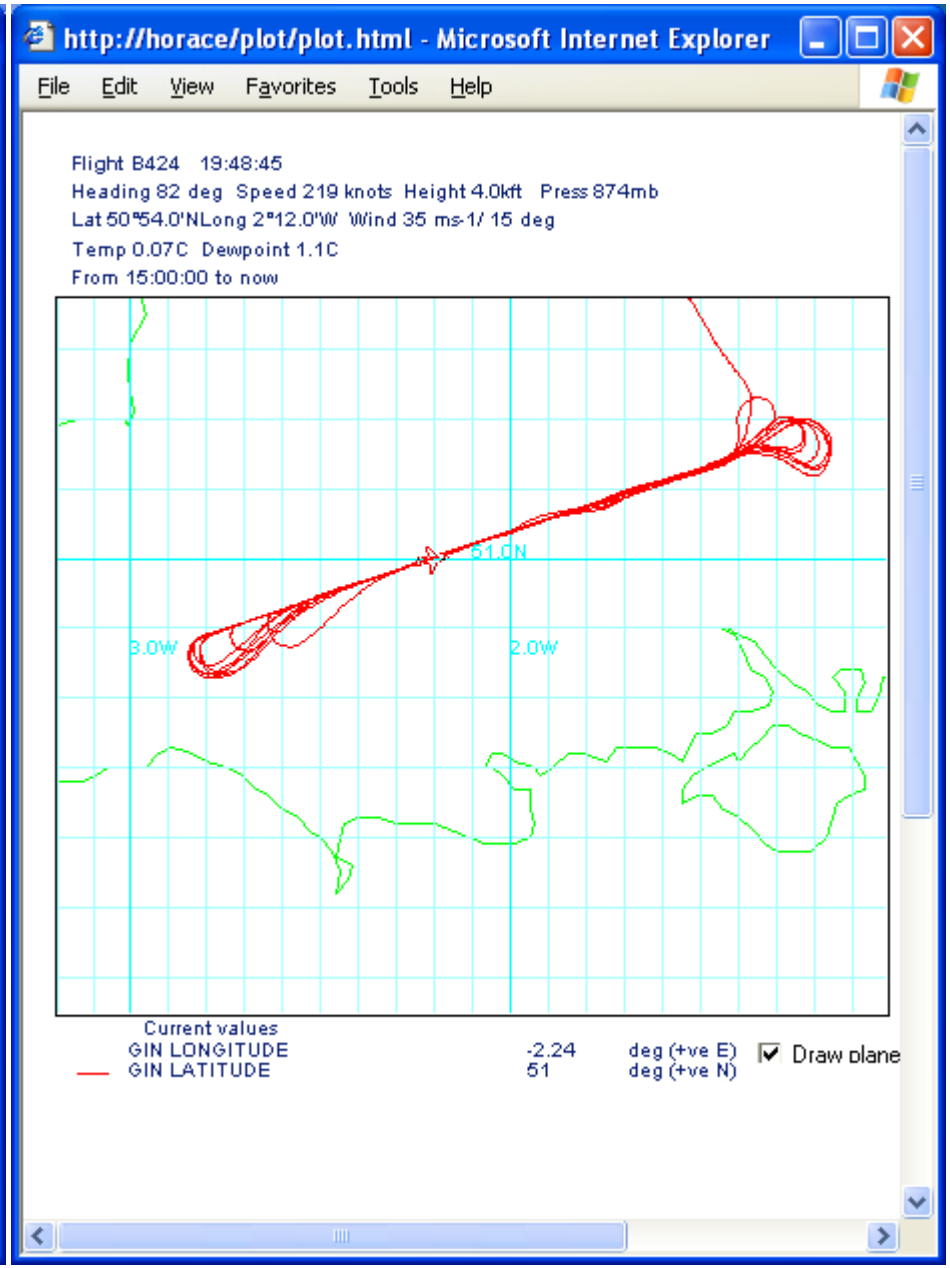


End R15 start P16



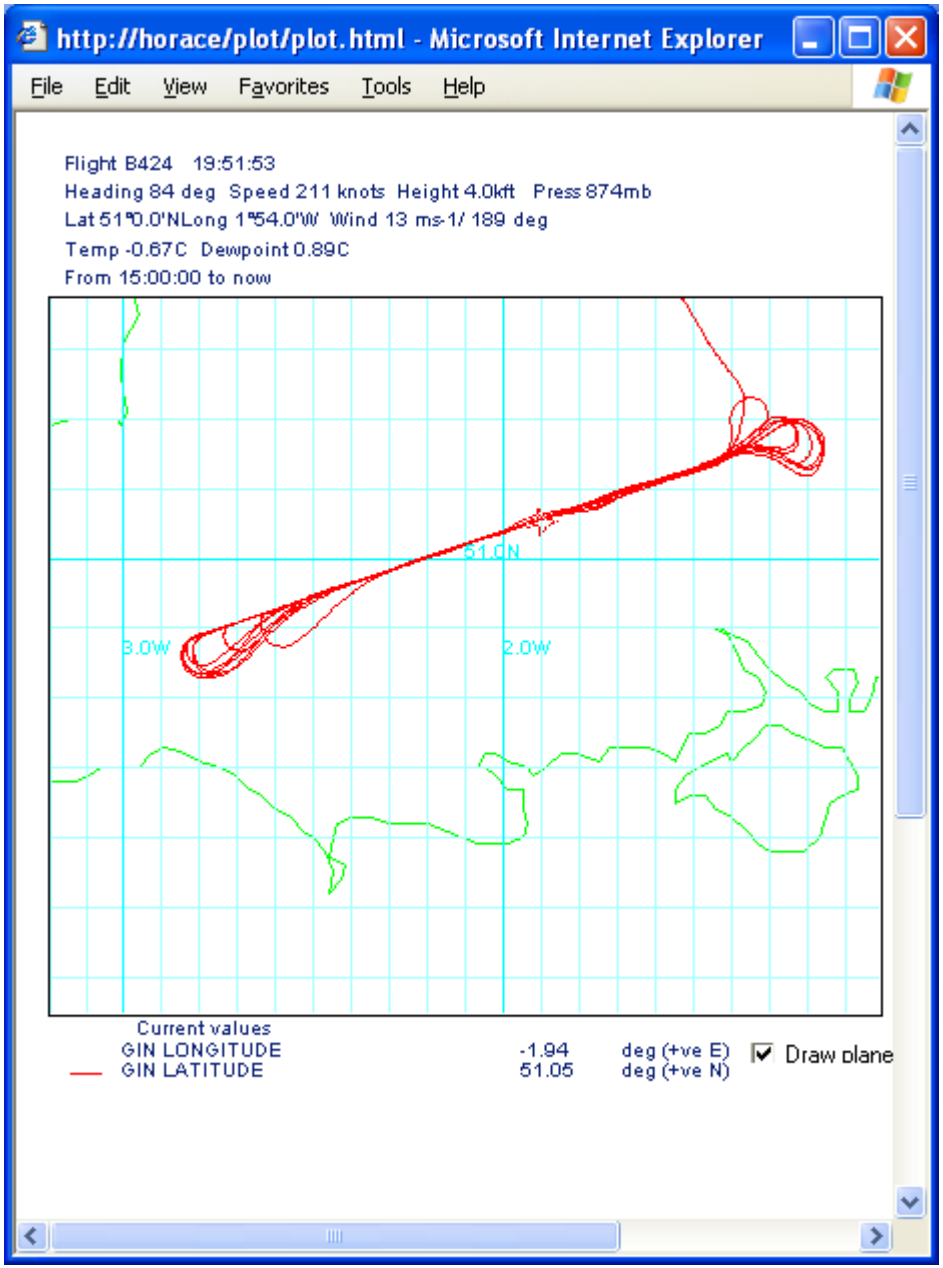
End P16 start R16

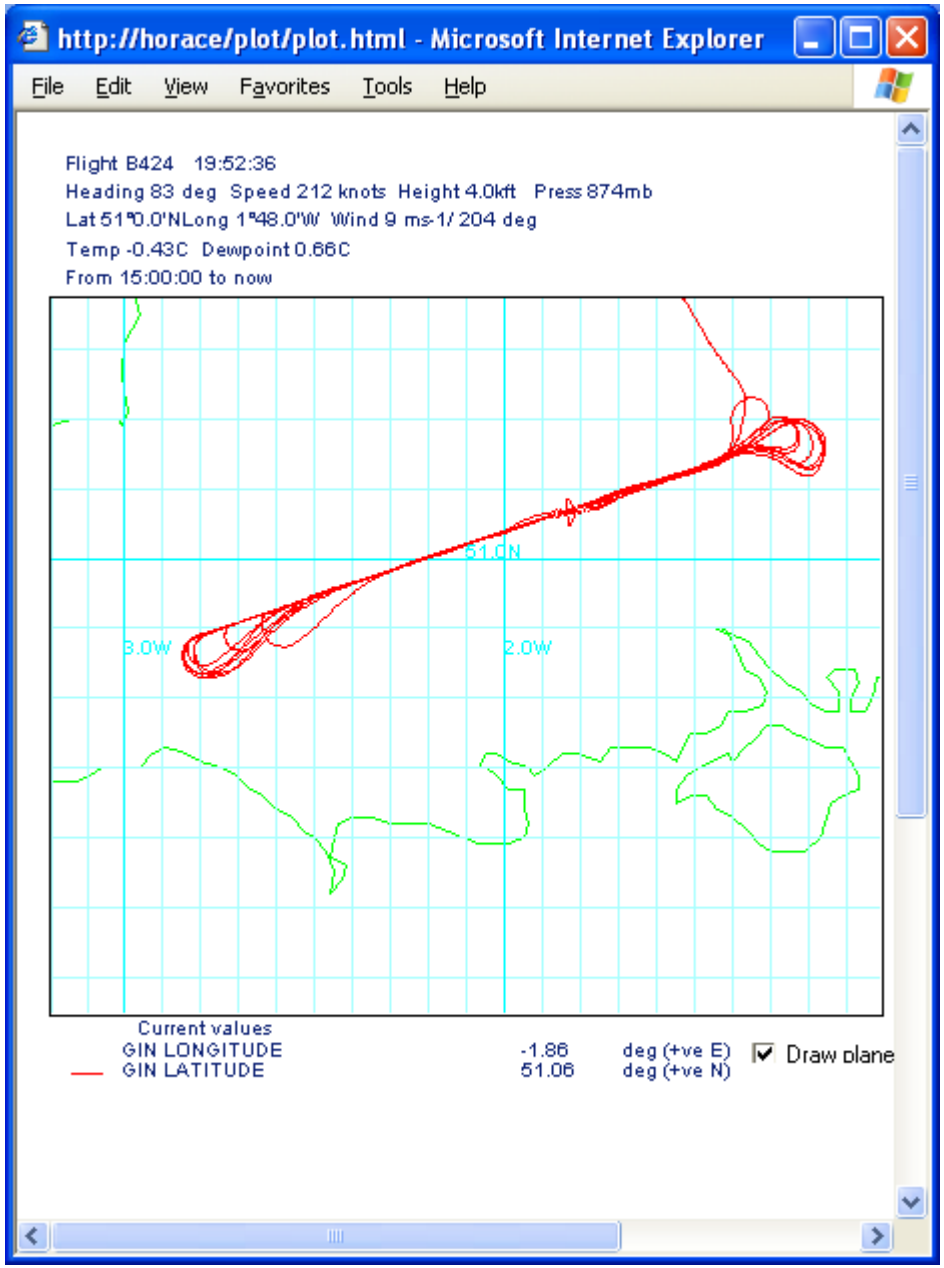




R16

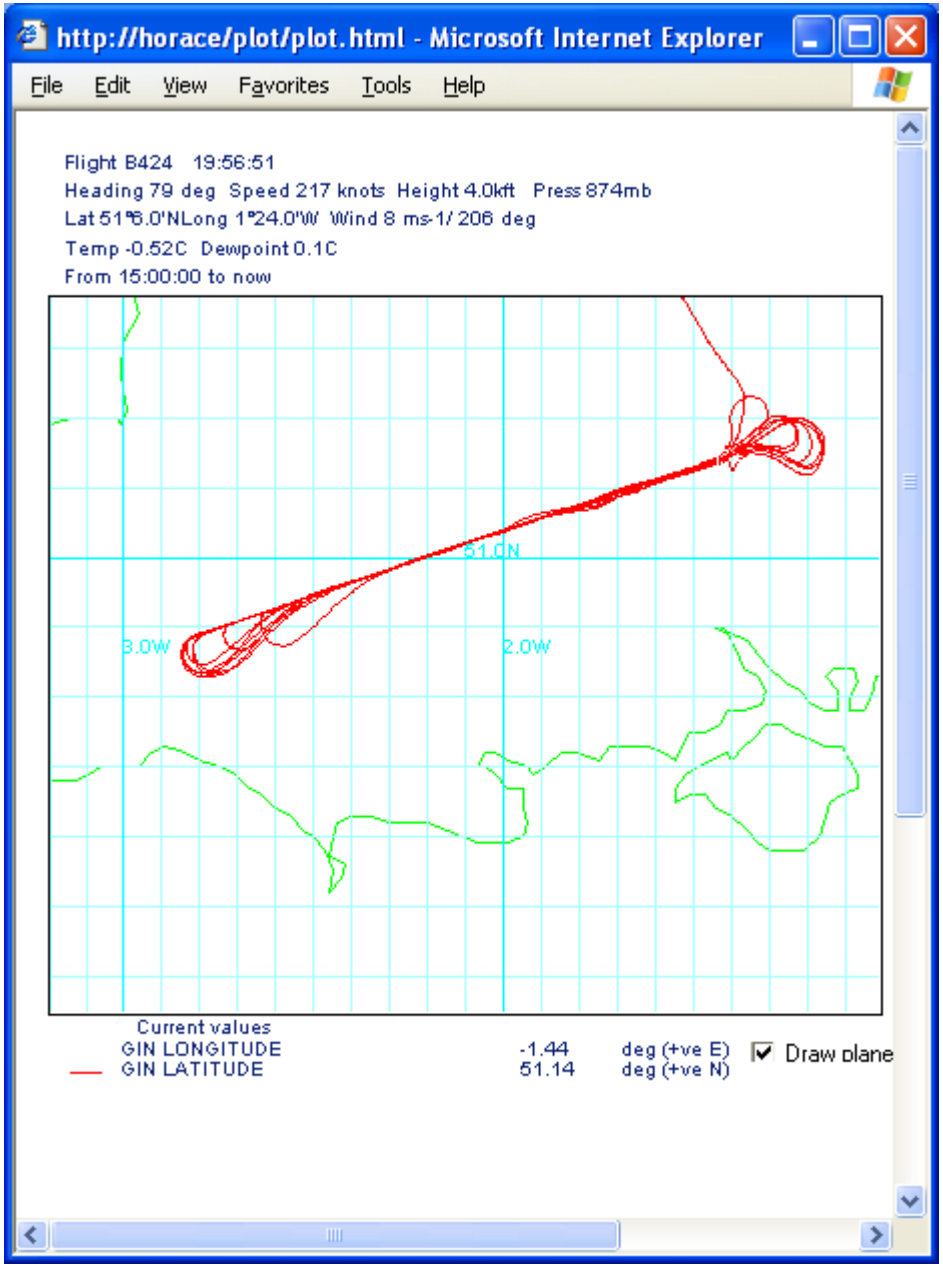
Turbulence here



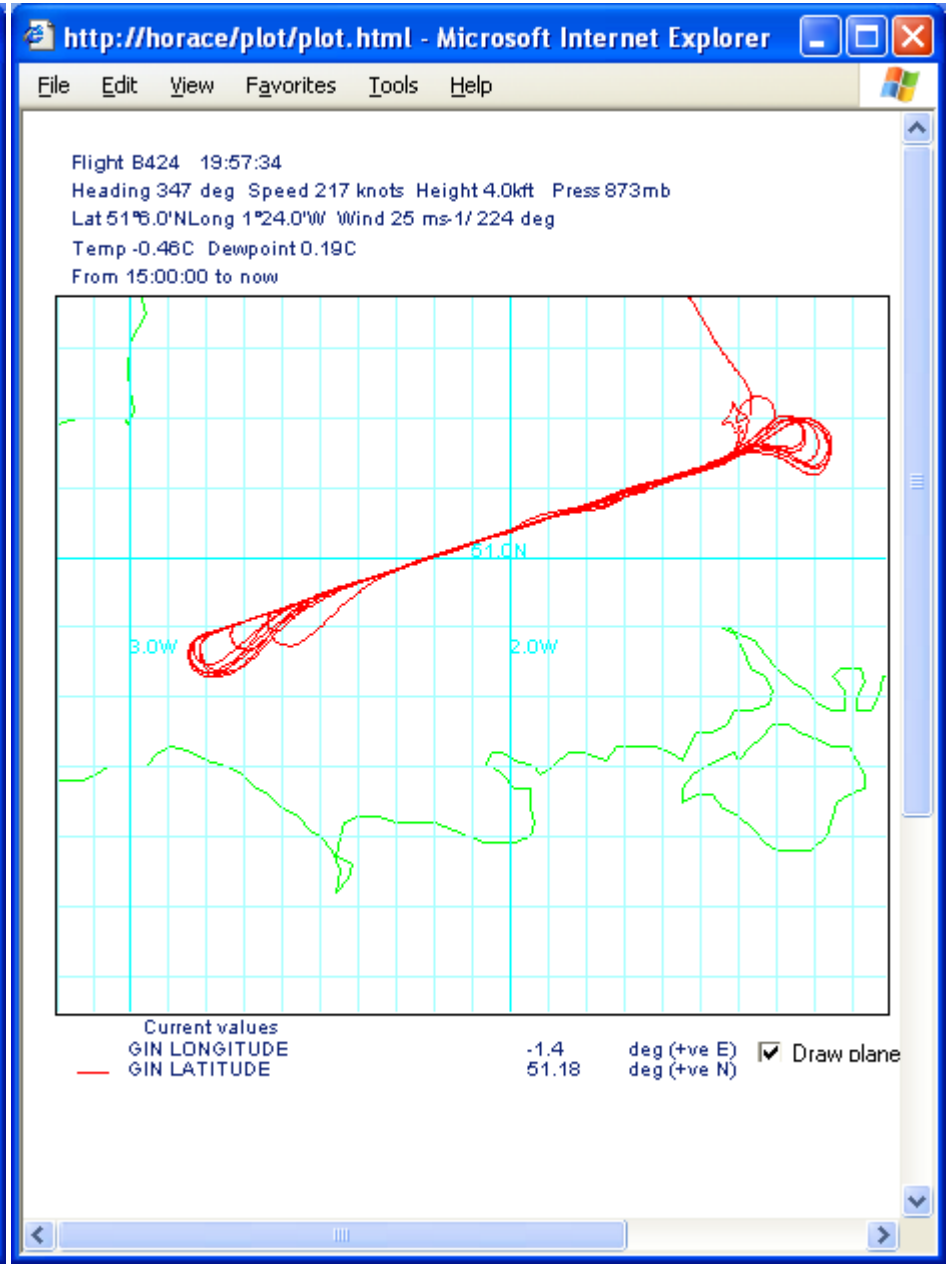


More turbulunce

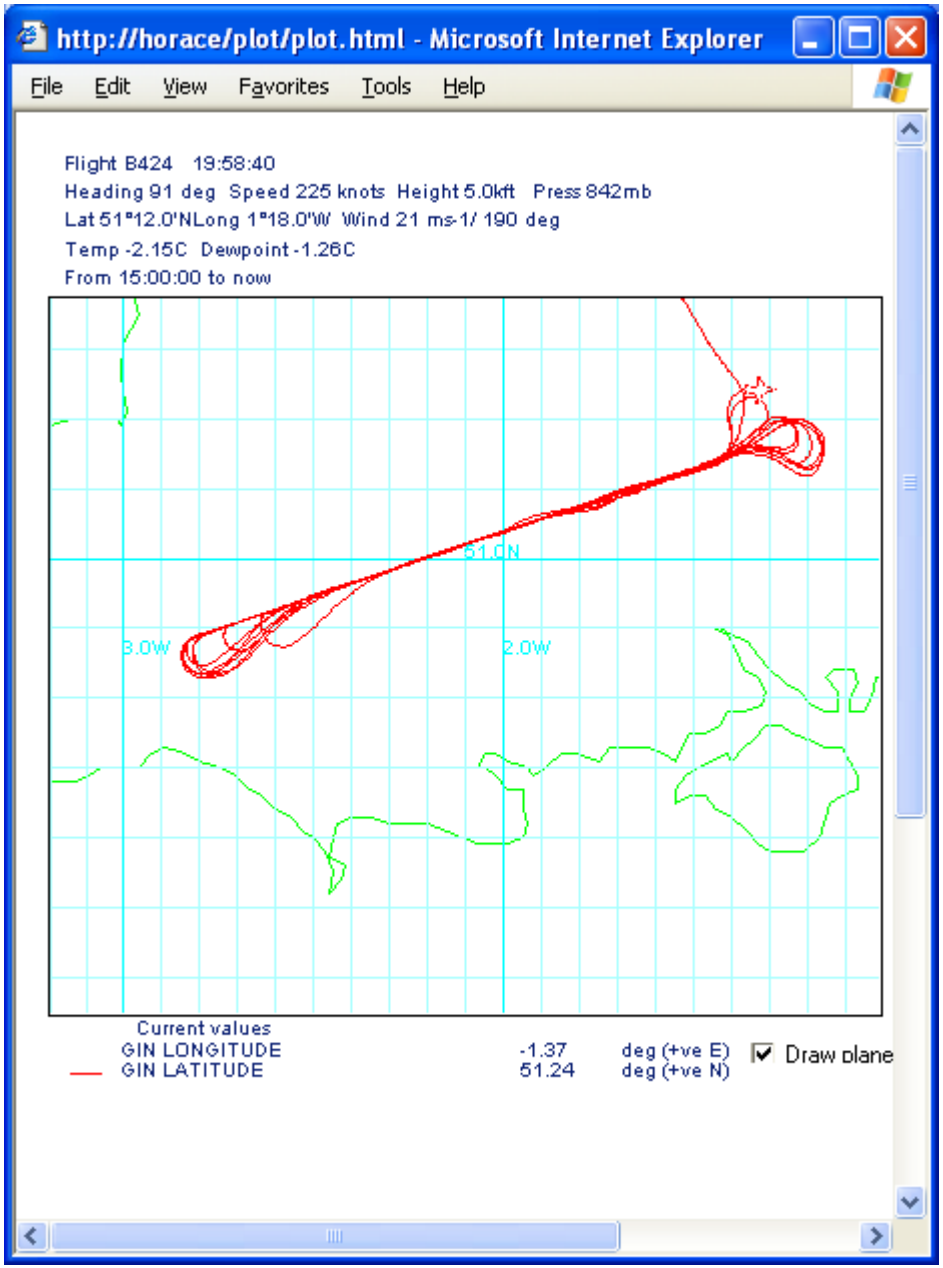
Seeing a lot of ice now

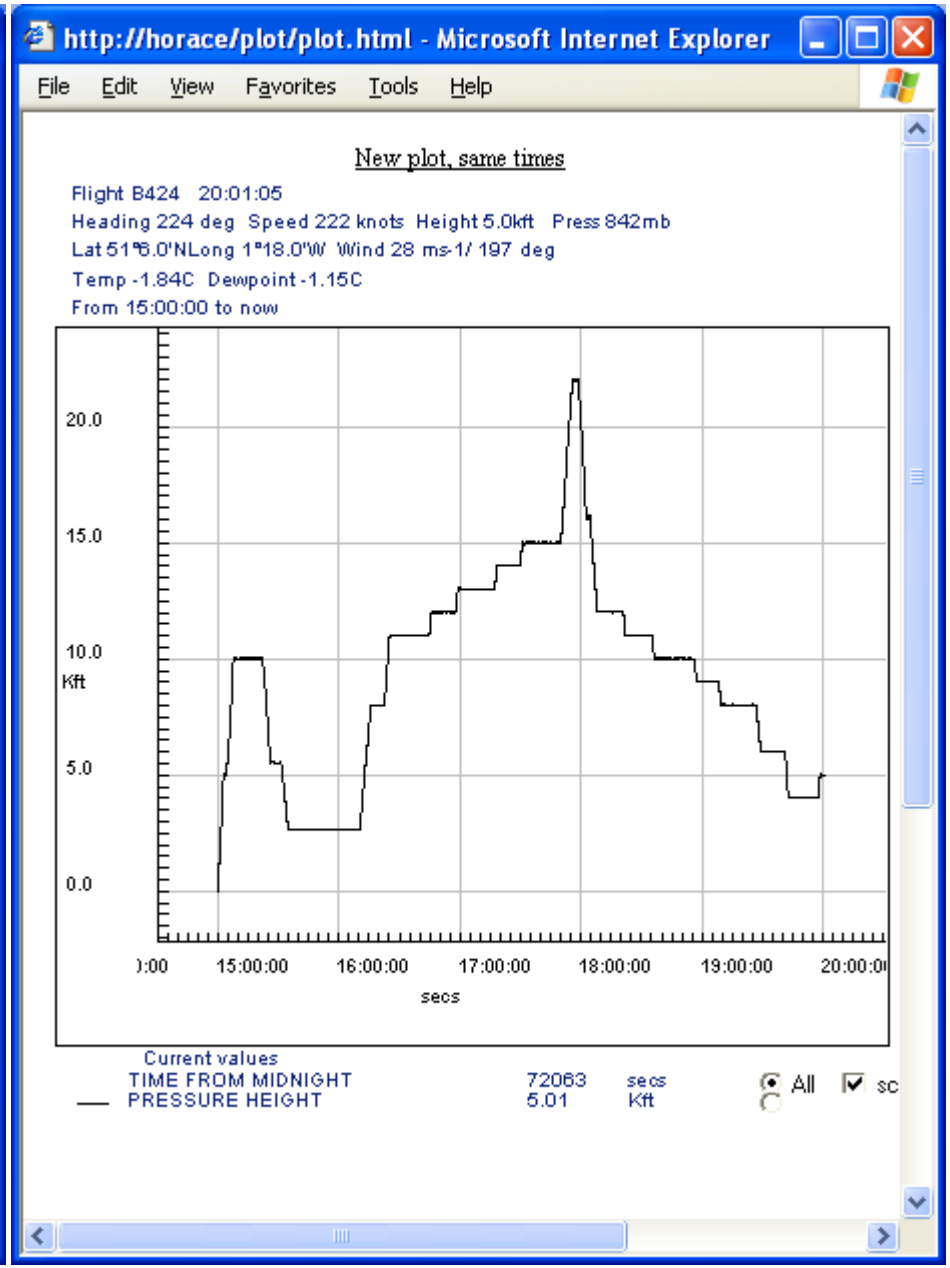


R16 over Chilbolton



End R16 start P17





End P17, start R17

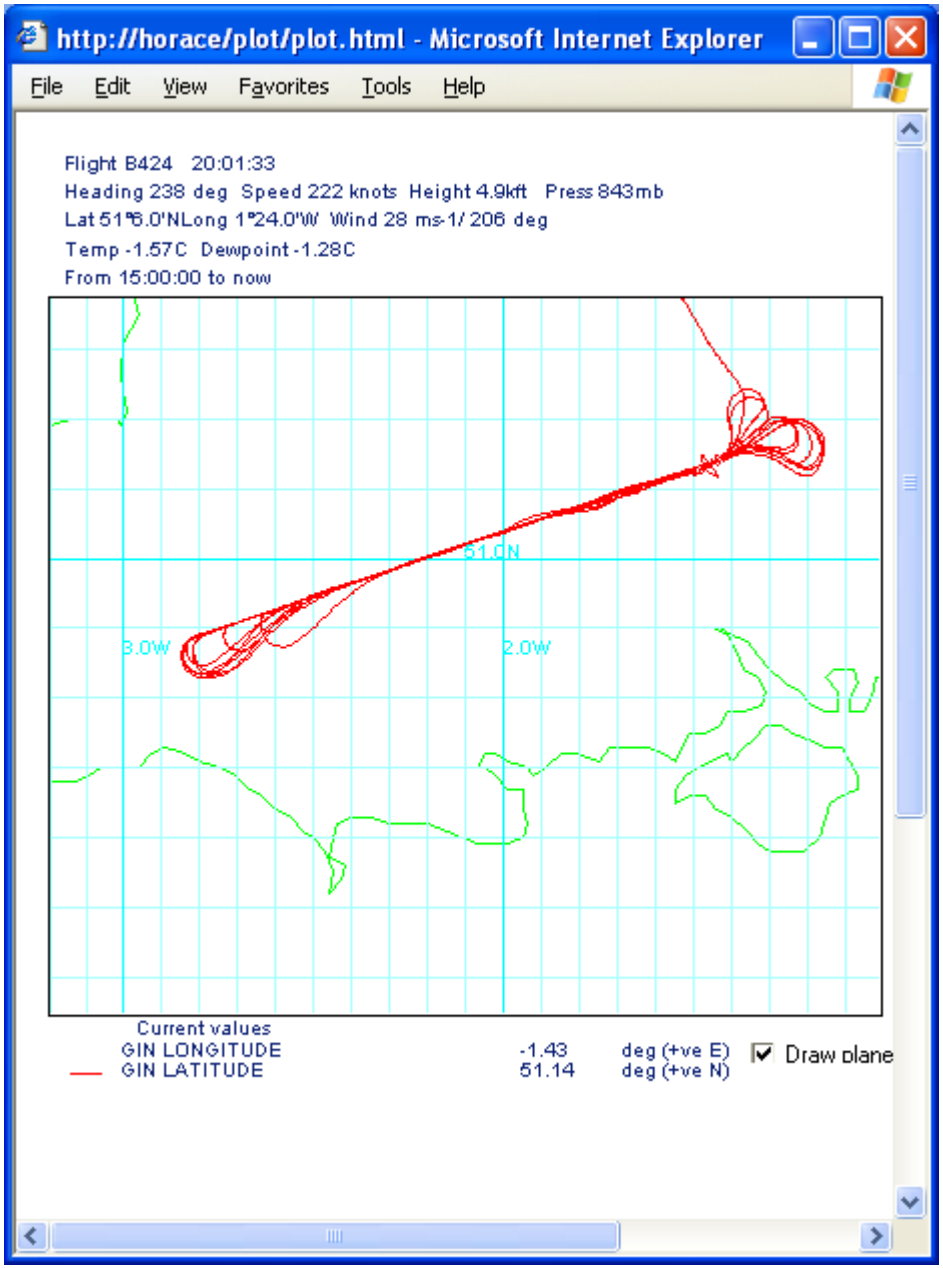
http://horace:1500/ - Microsoft Internet Explorer

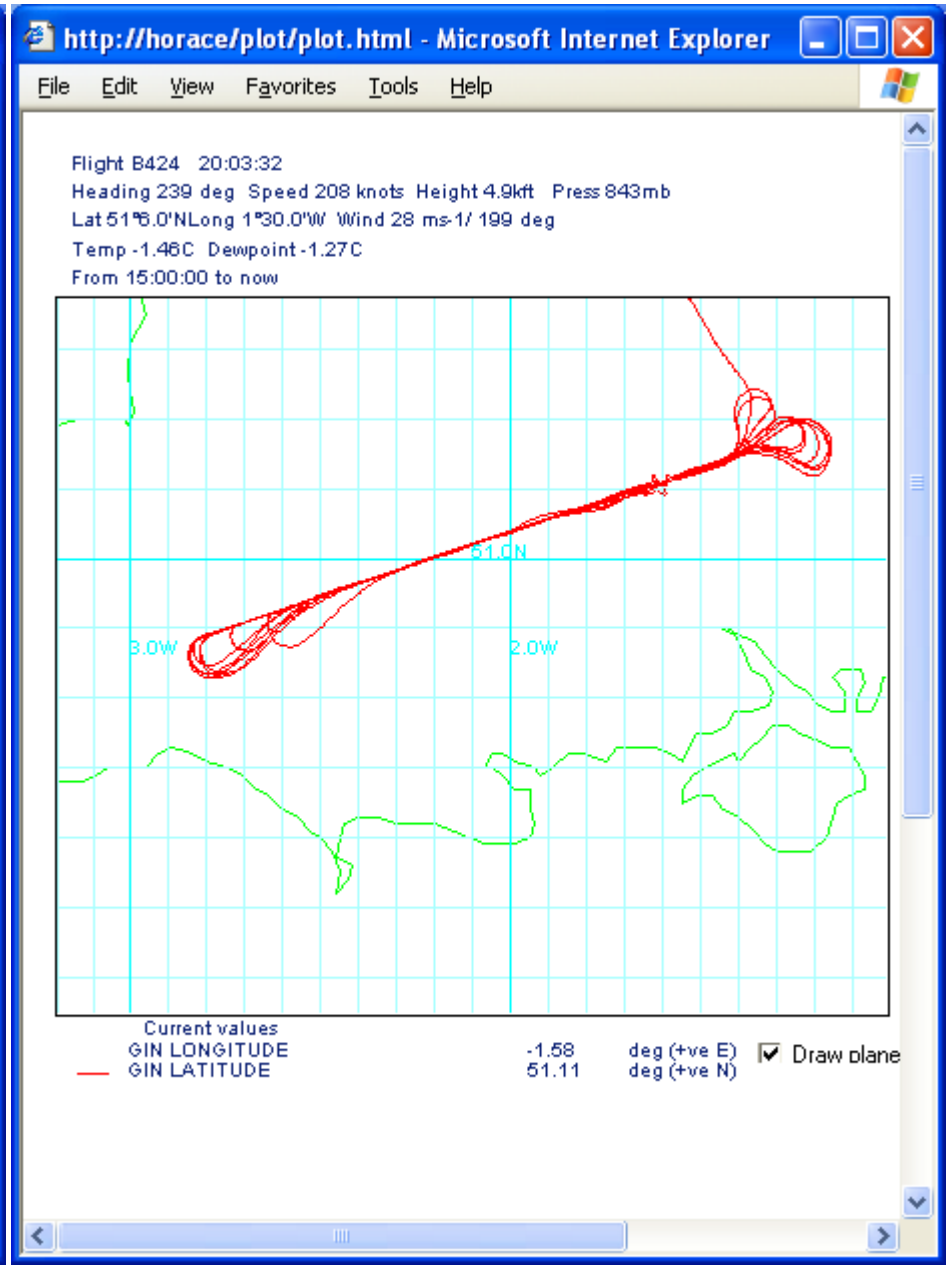
File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://horace:1500/#bottom Go Links

Run 8	17:31:04	257	15.0kft	50.9N	2.7W	17:49:55	255	15.0kft	51.1N	1.4W	
note	17:44:27	063	15.0kft	51.1N	1.4W						chilbolton
Profile 9	17:49:55	255	15.0kft	51.1N	1.4W	17:55:59	263	22.0kft	51.0N	2.0W	
Run 9	17:55:59	263	22.0kft	51.0N	2.0W	17:58:24	263	22.0kft	51.0N	2.3W	
note	17:56:08	263	22.0kft	51.0N	2.1W						water zeroed
Profile 10	17:58:24	263	22.0kft	51.0N	2.3W	18:02:42	259	16.1kft	50.9N	2.8W	interrupt
Profile 10	18:04:26	053	16.1kft	50.8N	2.7W	18:08:18	070	12.0kft	51.0N	2.3W	restart
Run 10	18:08:18	070	12.0kft	51.0N	2.3W	18:20:48	249	12.1kft	51.1N	1.4W	Chilbolton
note	18:15:38	073	12.0kft	51.1N	1.4W						chil
Profile 11	18:20:48	249	12.1kft	51.1N	1.4W	18:22:06	255	11.0kft	51.1N	1.5W	Chilbolton
Run 11	18:22:07	255	11.0kft	51.1N	1.5W	18:34:51	257	11.0kft	50.9N	2.6W	
Profile 12	18:34:51	257	11.0kft	50.9N	2.6W	18:36:26	255	10.0kft	50.9N	2.8W	
Run 12	18:36:26	255	10.0kft	50.9N	2.8W	18:56:02	252	10.0kft	51.1N	1.5W	
note	18:50:35	076	10.0kft	51.1N	1.4W						chilbolton
note	18:55:23	242	10.0kft	51.1N	1.4W						chilbolton
Profile 13	18:56:03	253	10.0kft	51.1N	1.5W	18:57:26	251	9.0kft	51.1N	1.6W	
Run 13	18:57:26	251	9.0kft	51.1N	1.6W	19:08:08	251	9.0kft	50.9N	2.5W	
note	18:59:47	252	9.0kft	51.1N	1.8W						185930 - lights underneath
Profile 14	19:08:09	251	9.0kft	50.9N	2.5W	19:09:34	250	8.0kft	50.9N	2.6W	
Run 14	19:09:35	250	8.0kft	50.9N	2.6W	19:26:33	243	8.0kft	51.1N	1.4W	chilbolton
note	19:21:38	079	8.0kft	51.1N	1.4W						chilbolton
Profile 15	19:26:34	243	8.0kft	51.1N	1.4W	19:30:15	245	6.0kft	51.1N	1.7W	chilbolton
Run 15	19:30:15	245	6.0kft	51.1N	1.7W	19:40:51	248	6.0kft	50.9N	2.6W	run 15 start 192915
Profile 16	19:40:52	248	6.0kft	50.9N	2.6W	19:42:53	242	4.0kft	50.9N	2.7W	run 15 start 192915
Run 16	19:42:53	242	4.0kft	50.9N	2.7W	19:57:59	357	4.4kft	51.2N	1.4W	
note	19:56:52	079	4.0kft	51.1N	1.4W						Chill-Bdog
Profile 17	19:57:59	357	4.4kft	51.2N	1.4W	19:58:37	085	5.0kft	51.2N	1.4W	
Run 17	19:58:37	085	5.0kft	51.2N	1.4W						



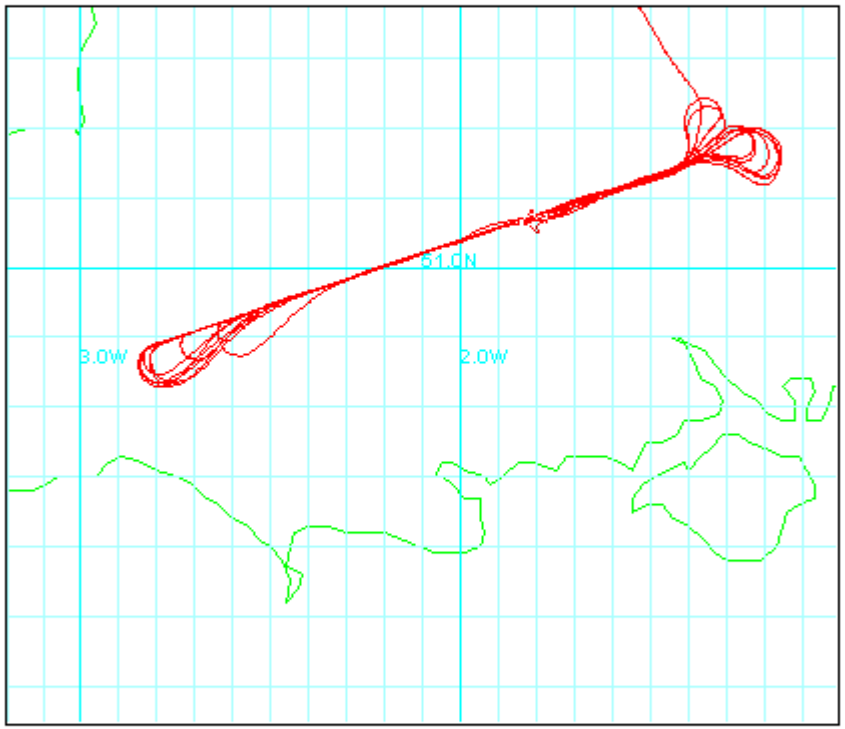


Start R17 SLR – overhead CH

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Flight B424 20:06:07
Heading 260 deg Speed 221 knots Height 5.0kft Press 842mb
Lat 51°0.0'N Long 1°42.0'W Wind 23 ms-1/ 215 deg
Temp -1.2C Dewpoint -0.29C
From 15:00:00 to now

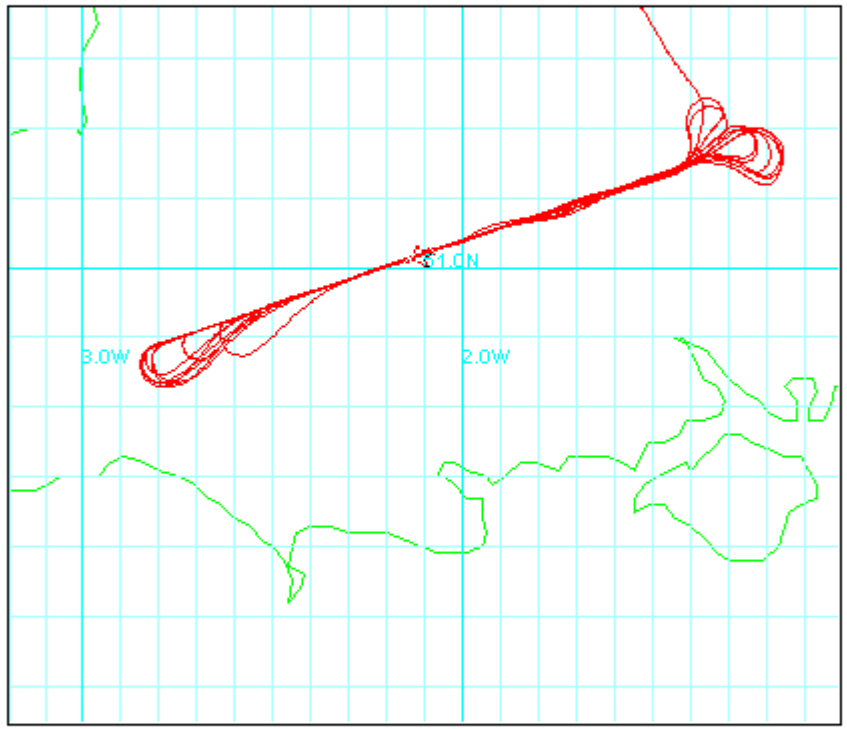


Current values
GIN LONGITUDE -1.78 deg (+ve E) Draw plane
GIN LATITUDE 51.07 deg (+ve N)

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Flight B424 20:09:46
Heading 245 deg Speed 219 knots Height 5.0kft Press 842mb
Lat 51°0.0'N Long 2°0.0'W Wind 25 ms-1/ 208 deg
Temp -0.13C Dewpoint 0.13C
From 15:00:00 to now



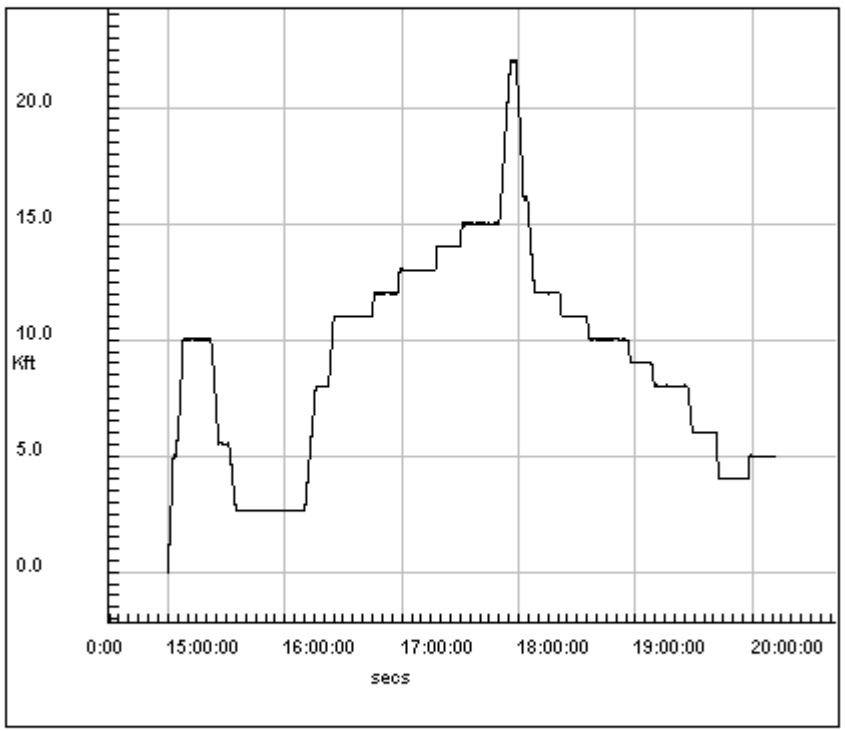
Current values
GIN LONGITUDE -2.08 deg (+ve E) Draw plane
GIN LATITUDE 51.02 deg (+ve N)

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

New plot, same times

Flight B424 20:11:37
Heading 245 deg Speed 215 knots Height 5.0kft Press 843mb
Lat 50°54.0'N Long 2°12.0'W Wind 25 ms-1/ 205 deg
Temp -0.87C Dewpoint -0.1C
From 15:00:00 to now

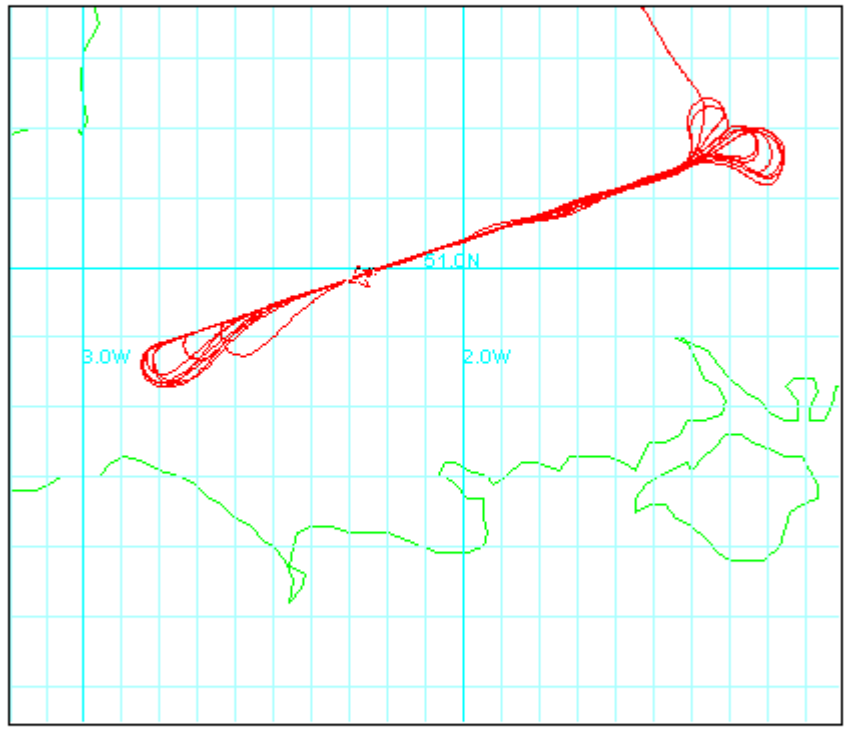


Current values
TIME FROM MIDNIGHT 72696 secs
PRESSURE HEIGHT 5 Kft
All sc

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Flight B424 20:11:52
Heading 245 deg Speed 216 knots Height 5.0kft Press 842mb
Lat 50°54.0'N Long 2°12.0'W Wind 26 ms-1/ 206 deg
Temp -0.98C Dewpoint 0.06C
From 15:00:00 to now

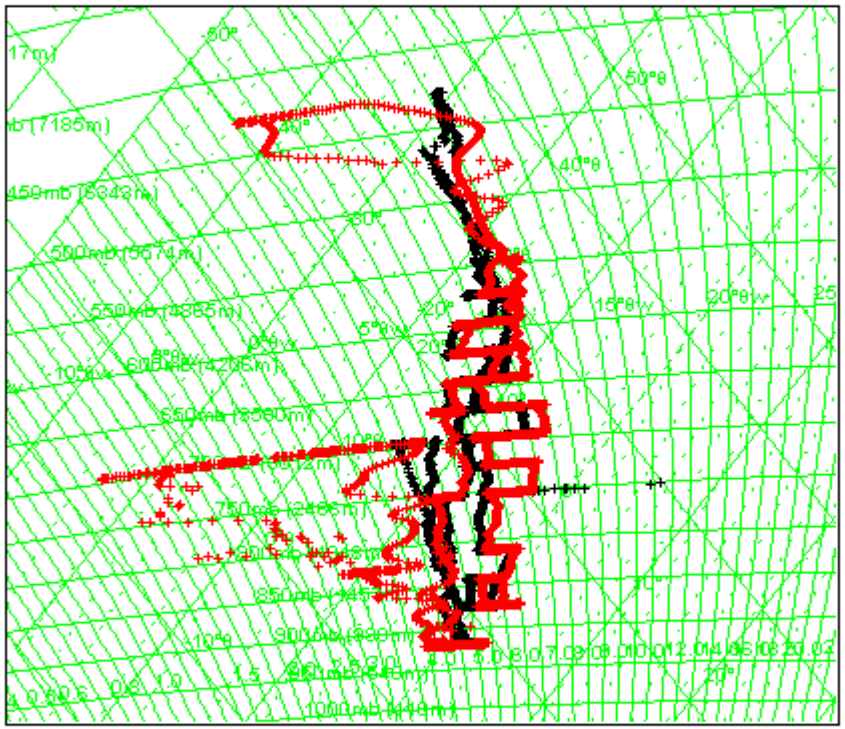


Current values
GIN LONGITUDE -2.24 deg (+ve E)
GIN LATITUDE 50.99 deg (+ve N)
Draw plane

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Flight B424 20:12:16
Heading 244 deg Speed 217 knots Height 5.0kft Press 842mb
Lat 50°54.0'N Long 2°12.0'W Wind 26 ms-1/ 206 deg
Temp -1.08C Dewpoint 0.0C
From 15:05:00 to now



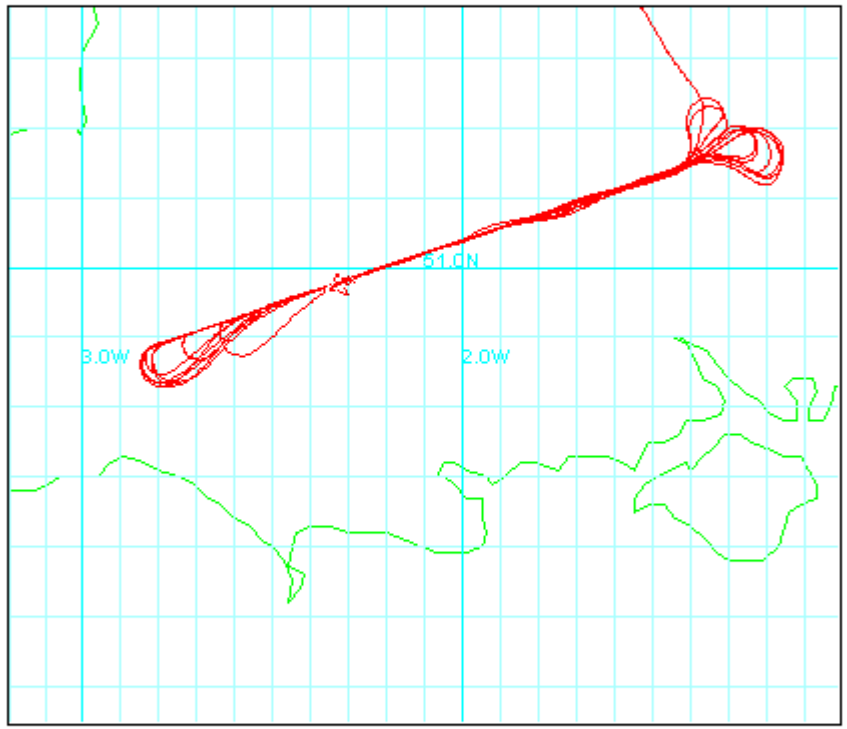
Current values

	STATIC PRESSURE	842.64	mb
++++	DEICED TRUE AIR TEMP	-1.09	deg C
++++	DEW POINT	0.01	deg C

http://horace/plot/plot.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Flight B424 20:12:33
Heading 244 deg Speed 218 knots Height 5.0kft Press 842mb
Lat 50°54.0'N Long 2°12.0'W Wind 26 ms-1/ 208 deg
Temp -0.93C Dewpoint 0.13C
From 15:00:00 to now



Current values

	GIN LONGITUDE	-2.29	deg (+ve E)
——	GIN LATITUDE	50.98	deg (+ve N)

☑ Draw plane

B424 xChat Discussion log

Now talking on #APPCLOUDS
<Doug_> test from FAAM
<Foggy> cloud looks good on Chiily radar main band just arriving
<faam146> thanks. It seems the cloud base is 2 km and top 6 km.
* radchobs (~radar@193.63.181.9) has joined #APPCLOUDS
<radchobs> Chilbolton Observatory is online
<Foggy> I am Tom , who is radchobs
<radchobs> radchobs represents the Chilbolton radar operators
<radchobs> At the moment, Chris is operating
<Foggy> Thanks
<Foggy> I am logging off briefly to change computers should be back in 10 mins
* Foggy has quit ("Leaving")
<faam146> looking good up here, low level runs good, climbing to higher levels
<faam146> once we have worked FL110, what do you want us to do next?
<faam146> thats to chris
<radchobs> The radar doppler spectra is showing bimodality between 3400-3700 metres
<radchobs> This could be supercooled droplets growing into ice crystals
<radchobs> Suggest we investigate this range of heights?
<radchobs> We also see gravity waves, wavelength 1 km, throughout much of the cloud layer
<faam146> Thanks. Just told the manager
<faam146> out next level is about 12000 feet.
<faam146> which is in the middle of your range
* blyth (~blyth@217.28.34.132) has joined #APPCLOUDS
<faam146> Hi alan, this is zhiqiang
<blyth> Hi guys. I'm on a train. How's the flight?
<faam146> It goes well
<faam146> Hi Chris, we will go back this layer again
* TomC (Tom@puhk3nwwky.ge.phy.umist.ac.uk) has joined #APPCLOUDS
<TomC> Now back had a problem with VIRUS scanner blocking port
<radchobs> Are you in the layer now?
<faam146> Just flew a bimodality layer at about 12k feet, where supercooled drops may grow into crystals.
<blyth> What' s the temperature?
<radchobs> we're seeing enhanced spectral width from about 3500m down to the melting layer overhead now, possible riming from fast doppler velocities (1.5m/s)
<TomC> Conference call in 15 mins any thoughts from aircraft
<faam146> we are doing profile run now, will fly below that layer and see the microphysics
<faam146> Chris, what are the cloud type above the layer?
<radchobs> Cloud type above the layer is cirrus up to about 6 km.
<faam146> Tom, instruments well except CPI and turbulence instrument.
<faam146> Thanks, Chris.
<TomC> Presumably turbulence probe iced up CPI in Manchester so ....
<TomC> About to ring into conference call
<faam146> This is snow at 13k ft
<faam146> There is snow at 13k ft
<TomC> suggestion 11 an take-off tomorrow
<blyth> At -15C?
<faam146> We are going to do the mission until 8pm local.
<faam146> We can stay the mission until 8 pm.
<TomC> Conference call ended take off suggested 11.30 tomorrow, possible slippage OK
<TomC> That means mission tonight ends on landing at Exeter
<TomC> CPI now fixed
<radchobs> have you found any supercooled? radar is showing cloud top descending now 5km o/h. shear layer at 3000m.
<faam146> Thanks for suggestion of take-off time.
<TomC> Have you encountered supercooled water important to identify where this is
<faam146> We found supercooledwater
<radchobs> where have you found supercooled water?
<faam146> Supercooled water at -16C and 13 kft
<radchobs> we are also seeing high ZDR and spectral width signatures at 3.5-4 km
<faam146> supercooled height is 15kft not 13 kft
<radchobs> we see a weak signature there too. the signature at 3500m is stronger, why not try there?
<faam146> Thanks, told mission scientist.

<radchobs> very interesting layer between 2200m and the melting level, possible riming/graupel formation.
<TomC> Very important that messages from radchops are relayed to Mission Scientist
* blyth has quit ("Leaving")
* faam146 has quit (Ping timeout)
* faam146 (~MPDS@203.38.13.15) has joined #APPCLOUDS
* faam146 has quit ("Leaving")
* faam146 (~MPDS@203.38.13.15) has joined #APPCLOUDS
<faam146> just disconnected and this is a test
<radchobs> you seem to be connected ok now
<radchobs> what are your flying plans now?
<faam146> could you sumrize the conditions below 12 kft and the features, what you would like us to do?
<radchobs> we are seeing enhanced spectral width in fall streaks from 2000m down to the melting layer. suggest runs in this range
<radchobs> some high ZDR values at 2000m also, out to 25 km west of Chilbolton
<faam146> Thanks, we are planning
<radchobs> ok, let us know what you decide
<faam146> a summary of last few runs:
<faam146> run10: 18:04-18:20 12 kft Chilbolton
<faam146> run11: 18:22-18:36 11 kft
<faam146> run12: 18:36--- 10 kft, 50.9N 2.8W
<radchobs> we are seeing fast falling ice particles between 2700 m and 3500 m, did you find any evidence for this?
<faam146> Yes.
<faam146> now descending to 9000 ft for a slr
<radchobs> we see a patch of high ZDR between 1700-2200 m, 15-40 km west of chilbolton
<faam146> just told mission scientist.
<faam146> run 13: 18:56-- 9 kft, 51.1N 1.6W
<radchobs> also, layer of high ZDR also at 4 km, between 5-20 km west of chilbolton.
<radchobs> i guess this is cloud top
<TomC> to avoid timeout, still here
<faam146> Just told M. Sci.
<faam146> run 13 ended at 19:08 at 50.9N 2.5W
<faam146> run 14 started 19:09 at 50.9N 2.6W, 8 kft
<faam146> paul here briefly. going to do 8kft, 7kft and 6kft i believe than land exeter
<radchobs> thanks paul
<faam146> new update, 8kft, 6kft then 4 and maybe back up to 6kft. JC and KB in discussion
<faam146> ETA Exeter 20.30, all going well
<faam146> are the shafts you saw still precipitating out?
<radchobs> these seem to have advected past us now- some interesting streaks (high zdr) at 4-6kft about 20-45km west of chilbolton
<Doug_> copied eta, no need to use satcom to confirm
<faam146> reported to M. Sci.
<radchobs> can we have an update on current position and plans please?
<faam146> currently seeig dropsaround 200um, 2DS reckons some might be sticking together
<faam146> sure, currently at 6kft heading SW. i believe we are doing 4kft(NE) next and then back to 5kft (SW)
<faam146> at 19:34, at 51.N, 2.6W, heading 200 deg
<radchobs> thanks
<TomC> Please let us know when you leave station to head to Exeter
<faam146> at 19:43, height 4 kft, heading NE, the run before the last one.
<faam146> at 19:58, Just over pass Chilbolton, the final leg, 5kft
<faam146> heading west.
<faam146> at 20:04, about 16 min on station.
<Doug_> copied
<TomC> Sounds like a really good case, signing off now
* TomC has quit ("Leaving")
<Doug_> Dave K will be at security gate with transport at approx 20:45, you'll probably not be off the a/c until at least 9 though
<radchobs> safe journey back, cheers chris & andrew at chilbolton
<faam146> doug, ams here, i may need more than 30 mins
<faam146> Thank you all.
<Doug_> AMS, no problem, Dave knows u will be an hour(ish)
<faam146> thanks.
* radchobs has quit ("Leaving")
<faam146> landing, goodbye.
* faam146 has quit ("Leaving")

Cloud Physics Flight Log B424

Date:21/1/09	Operator:PDR	DRS Time:+0	DAU1 Time:+0	DAU2 Time:+0	DAU3 Time:+0	AUX1 Time:+0	Aux2 Time:+0

	PCASP		2DC		2DP		CDP		FFSSP		UMan FSSP		PIP	
Operated?	Y		Y		N		Y		Y		Y		Y	
Pre-flight checks	Vref:	N/A	El#1 V:	2.0	El#1V:	N/A	Laser V:	4.0	Ref V:	3.4			El#1 V:	1.86
	Flow:	0.80	El#32 V:	1.6									El#64 V:	2.62
	T (°C)	6.14												
	P (hPa)	988												

GMT	Height	PCASP		2DC		2DP		Habit	FFSSP	CDP		UMan FSSP		PIP			Comments
		#/cc	Mean R	#/L	Max size	#/m^3	Max size		Blocks Tx	#/cc	MVD	#/cc	MVD	#/cc	Max size	LWC	
15:00:40																	Heaters switched on
15:01:00	~015	250-10															Exited boundary layer
15:31:12	055	10															Start profile 2
15:31:58	050	17															
15:33:11	040	21															
15:34:23	030	16															
15:35:05	026	11															End profile 2 start run 1
15:37:00	026	25															
15:39:00	026	35		20				Wet snow	6	1		4		0.005			
15:44:00	026	21		8				Water drops	10	1		1		0.003			
15:47:00	026	16		1				Water drops	11	1		1		0.01			
15:49:00	026	27		20				Water drops	17								
15:51:19																	End run 1
15:52:50	026	35		6				Water drops	32					0.002			Start run 2
15:55:00	026	43		5				water	59					0.001			
15:57:00	026	20		1				water	60					0.001			
15:59:00	026	30		7				water	61					0.001			
16:02:00	026	20		21				Wet snow	64					0.002			
16:04:00	026	25		7				water	65					0.001			
16:06:00	026	20		2				Wet snow	65					0			End run 2

FAAM

Cloud Physics Flight Log B424

GMT	Height	PCASP		2DC		2DP		Habit	FFSSP	CDP		UMan FSSP		PIP			Comments
		#/cc	Mean R	#/L	Max size	#/m^3	Max size		Blocks Tx	#/cc	MVD	#/cc	MVD	#/cc	Max size	LWC	
16:10:09	026	20		0					66					0			Start profile 3
16:11:20	035	25		65				Small ice,needles/columns	68					0.02			
16:13:25	055	30		20				Needles/columns , agg	71					0.04			
16:14:30	065	15		20				Small ice, agg	72					0.005			
16:15:30	075	22		10				agg	72					0.005			
16:16:00	080																End profile 3
16:18:00	080	25		60				Agg, small ice	79					0.005			
16:20:00	080	15		60				Agg, small ice	84					0.01			
16:22:00	080	50		100				Agg, small ice	95					0.01			End run 3 start profile 4
16:26:20	109	2		15				snow						0.002			End profile 4 start run 4
16:29:00	109	20		100				Agg, snow	125					0.005			
16:32:00	110	5		30				Agg, snow	130					0.005			Occassional bimodal
16:35:00	110	7		44				agg	140					0.004			Distribution seen on pip
16:40:00	110	60		35				agg	146					0.01			Modes at 1mm & 100 um
16:43:00	110																
16:45:00	110	2		20				Agg, plates	151					0.005			End run 4
16:46:20	120	20		15				Plates, agg	152					0.005			Start run 5
16:49:00	120	0		12				Agg, plates	155					0.005			
16:51:00	120	15		5				Agg, plates	156					0.001			
16:55:30	120	5		50				agg	165					0.01			Possibble bimodal dist
16:58:00	120	40		150				agg	177					0.025			End run 5
16:59:00	130	36		130				snow	191					0.01			Start run 6
17:01:00	130	270		130				Agg,snow	212					0.03			
17:03:00	130	4		20				Snow,agg, plates	218					0.002			
17:07:00	130	2		10				agg	221					0.002			

FAAM

Cloud Physics Flight Log B424

GMT	Height	PCASP		2DC		2DP		Habit	FFSSP	CDP		UMan FSSP		PIP			Comments
		#/cc	Mean R	#/L	Max size	#/m^3	Max size		Blocks Tx	#/cc	MVD	#/cc	MVD	#/cc	Max size	LWC	
17:10:00	130	0		15				agg	226					0			
17:17:15	130	0		0					227					0			End run 6
17:18:20	140	0		10				agg	227					0.005			Start run 7
17:20:00	140	50		70				agg	233					0.015			
17:24:00	140	7		70				agg	243					0.005			
17:27:00	140	5		10				plates	247					0.005			
17:30:00	150	50		90				dendrites	258					0.025			End run 7
17:31:00	150	0		8				agg	260					0.001			Start run 8
17:34:00	150	10		40				agg	266					0.002			
17:40:00	150	20		150					277					0.05			
17:43:00	150	70		45				Agg	289					0.01			
17:45:00	150	50		16				Agg	294					0.001			
17:50:0	150	16		36				agg	309					0.04			End run 8 start profile 9
17:51:00	160	18		10					316					0.002			
17:52:00	170	6		80					317					0.015			
17:53:00	185	15		0					318					0			
17:54:05	200	3		0					325					0			
17:55:00	210	0		0					325					0			
17:56:00	220	0		0					325					0			End profile 9 start run 9 PIP Hotwire DAT recorded during run
17:58:30	220	3		0					325					0			End run 9 start profile 10
18:02:45	160	3		0					345					0			
18:05:25	150	2		1				agg	357					0			
18:06:50	135	25		100				Dendrites, snow	361					0.02			
18:08:20	120	20		50				Agg,small ice	367					0.005			End profile 10 start run 10
18:15:00	120	25		25				dendrites	378					0.001			
18:17:30	120	15		100				Agg, plates	388					0.01			
18:20:00	120	3		30				Dendrites, snow	398					0.01			End run 10 start profile 11
18:22:05	110	7		20				snow	402					0.001			
18:30:00	110	30		325				Water drops	418					0.05			100um supercooled water drops
18:33:00	110	170		900	100			water	439					0			

FAAM

Cloud Physics Flight Log B424

GMT	Height	PCASP		2DC		2DP		Habit	FFSSP	CDP		UMan FSSP		PIP			Comments
		#/cc	Mean R	#/L	Max size	#/m^3	Max size		Blocks Tx	#/cc	MVD	#/cc	MVD	#/cc	Max size	LWC	
18:47:00	100							Water droplets									Away from console for previous 10 mins, peak 2dc conc 2000, liquid water droplets
18:49	100			3				Snow	490			1		0.001			
18:55:00	100	17		50				Snow	511			1		0.005			
19:09:40	080	0		35				Needles/ columns	604			2		0.006			Start run 14
19:14:00	080	30		400				Needles/ columns, water drops	626			10		0.05			
19:24:00	080	0		25				snow	647			2		0.003			
19:29:10	060	5		130				Water drops, columns	656			2.5		0.04			Start run 15
19:43:00	040	20		150				Water drops	769			40		40			Start run 16
20:25:00																	Heaters switched off

P.S.A.P. Log

Flight No. **B424** Date 21/01/2009 Page 1 of .. operator

GMT	Filter Trans.	Flow Rate	B_a x 10^{-6}	Ph_det levels		Run	Remarks
Set to DRS time: done Z	New filter Tr = 1.000 done	Set to 3.0 lpm: N/A				Ave =30 s	←Preflight
15:14	1	2.74	2.2	16	40	transit	

Flight No: B424 **Date: 21/01/2009** **Operator:J.Bowles**

Type of filters mounted in	Upper inlet:	Lower inlet:

Disk No 1 (top)	Disk No 2 (middle)	Disk No 3 (bottom)	Inlet Upper/ Lower	Time Pump On	Time Pump Off	Run	Accum Vol [l]	Comments eg. Filter Exposure No, period in cloud, change of level etc.
7	8	49	u	15:28	15:38	p1 & r1	554	counter not reset cloud
				15:40	15:43	r1	726	cloud
				15:45	15:47	r1	810	precip
								Blank flushed trough, counter reset
10	69	83	u	16:08	16:10	eor 2 - p3	165	Oops, fitted new filter. Only on for few mins manovering before P3

Flight: B424

KEY

- Not Fitted
- Fitted, Not Operated
- Duff Data
- Minor Problem
- OK

Thermometers
- Cabin Temperature:
- Heimann:
- Deiced Temp:
- Non-deiced Temp:

Hygrometers
- FWVS:
- Buck CR2:
- General Eastern:
- Johnson Williams:
- Nevzorov:
- Total Water Probe:

Cameras
- Downward Facing:
- Forward Facing:
- Rearward Facing:
- Upward Facing:

Navigation + Aircraft
- Cruciform GPS:
- GIN Applanix:
- INU Honeywell:
- Radar Altimeter:
- RVSM IAS:
- RVSM Static Pressure:
- XR5 GPS:

Misc Core
- HORACE:
- AMTG:
- AVAPS:
- Cabin Pressure:
- Printer:
- S9 Static Pressure:
- Satcom C:
- Satcom H (VIRC):
- Turb Centre-Static:
- Turb Left Right:
- Turb Up-Down:
- Turb Horizontal Chk:
- Turb Vertical Chk:
- Weather Radar:

DLUs:
- DLU AERACK:
- DLU BBR Lower:
- DLU BBR Upper:
- DLU Core Chem:
- DLU Core Consoles:
- DLU Port Aft:
- DLU Port Fwd:
- DLU Stbd Fwd:

Radiometers
Lower:
- BBR (clear) Lower:
- BBR (IR) Lower:
- BBR (red) Lower:

Upper:
- BBR (clear) Upper:
- BBR (IR) Upper:
- BBR (red) Upper:

- ARIES:
- DEIMOS:
- IR Camera:
- JNO2 Lower:
- JNO2 Upper:
- JO1D Lower:
- JO1D Upper:
- MARSS:
- SHIMS Lower:
- SHIMS Upper:
- SWS:
- TAFTS:

Cloud Probes
- 2DC:
- 2DP:
- FFSSP:
- PCASP:
- PCASP SPP-200:
- 2DS:
- ADA:
- CAPS:
- CCN:
- CDP (fuselage):
- CDP (Canister):
- CIP 100 (PIP):
- CIP 25 (CIP):
- CPI:
- CVI (Inlet):
- CVI PCASP-X:
- CVI Ly-A Hygro
- FSSP (UMan):
- SID1:
- SID2:
- SID3:

Aerosol
- CPC 3025A:
- CPC 3786 H2O:
- Filters 47mm:
- Filters 90mm:
- Neph - Dry:
- Neph - Wet:
- PSAP:
- AMS:
- CPC (AMS):
- SMPS (AMS):
- CPC 3010A (CVI):
- INC:
- Mini-LIDAR:
- SP2:
- UHSAS:
- VACC:

Chemistry
- CO Aerolaser 5002:
- NOx TE42C:
- Ozone TE49C:
- Ozone TE49:
- SO2 TE43C:
- TDLAS (NIR) CH4:
- TDLAS (NIR) CO2:
- FAGE:
- Formaldehyde:
- NOx FAAM:
- NOxy:
- ORAC:
- PAN:
- PERCA:
- Peroxide:
- PTRMS:
- TDLAS (1C):
- WAS Bags:
- WAS Bottles:

Misc Non-Core
- CASI/ATM:
- LIDAR (big):
- LTI:
- SAW Hygrometer:

Report Created 15/09/2009 14:26:15

Last Updated: 23/01/2009 11:36:13

Faults / Incidents Log

Flight No. B424
Date: 21/1/09

Issues

Instruments

Dropsondes	Nil
CVI -	Inlet iced at various times
Nevzerov	TWC alarm light on switched off @ 19:37
Buck -	experimental operation ->appears ok
FWVS	Not working
Turbulence	iced 16:27 and got worse through the flight

Aircraft

SatcomC	ops normal
MPDS	xchat worked well
ISDN Emails	Not used
Satcom-H Calls	Nil

Pre-Flighter's Log

Date: 21/1/04 Flight No: 6426 Pre-Flighter: AMW/RLP

Item	√ or x	Location	Action	Comments
1	✓	Hangar	Collect Dustbin, put on a/c	
		Aircraft Cabin		
2	✓	Core Chemistry	Gases x 3 ON	
3	✓	Cabin	All Racks Checked	
4	✓	Fwd CorCon	All reqd CBs made	
5	✓	Aft CorCon	CBs made, PCs ON	
6	✓	HORACE	Optical Disk loaded	
7	✓	HORACE	Recording data	
8	✓	HORACE	DLU Status Checked	
9	✓	HORACE	HORACE Status Checked	
10	✓	Satcom H	Power LED ON	
11	✓	Nevzorov	Checked and OFF	
12	✓	GPS	Checked	
13	✓	INU	Align	
14	✓	Cameras Pictures	Checked x 4 OK	
15	✓	Core Chemistry	Instruments Checked OK	
16	✓	Core Chemistry	CO Flows Checked OK	
17	✓	FWVS	Set up	
18	✓	Video x 2	Records okay, Rewind	
19	✓	Delced Rosemount	Heater Checked / Set	
20	✓	Heimann	Calibration Checked	
21	✓	TWC	ON & Checked	
22	✓	GE	Balance checked	
23	✓	INU	Navigate then back to Align	
24	✓	Hubs x 4	Checked ON	
25	✓	Fwd Console	Miss. Sci Laptop CB made	& CB on Port Fwd SSP
26	✓	CNC	Butanol filled	
27	✓	CGPS	Set up	
28	✓	Miss. Sci Laptop	Checked Onboard	

External Checks overleaf →

Pre-Flighter's Log

Item	√ or x	Location	Action	Comments
		External		
29	✓	Turb Probe	Clean if reqd, Photo taken	
30	✓	JW	Cleaned & Checked	
31	✓	DI Rosemount	Cleaned & Checked	
32	✓	NDI Rosemount	Cleaned & Checked	
33	✓	Nevzorov	Cleaned/windings checked	
34	✓	GE	Cleaned & Checked	
35	✓	Lower BBRs	Domes cleaned/checked	
36	✓	Camera Windows	Cleaned	
37	✓	Heimann	Lens checked OK	
38	✓	TWC Cover	Fitted if required	
39	✓	All other covers	Removed	
40	✓	Dustbin	Returned to hangar	
41		Tools	Check ALL in Toolkit	
42		Tools	Avalon informed	

		Avalon Checks	Signed
43		Upper BBRs Checked & Cleaned	
44		ICEX applied	
45	✓	Traps checked & dry	AMW

Wet Nephelometer Log

Flight No **B**..424 Date .21/01/09. Operator's name J Bowles…… Page .1..... of .....

GMT	Run	Height	Sample flow	Dry neph RH	Wet neph RH	Temp ramp	T_{water}	Remarks
15:27		5500						chiller on
15:29		5500	14.1		29.6	45	19	
15:32	p1							pre heat on
15:37	r1	2600	14.5	31	84.5	14		
15:39	r1							precip
15:44	r1	2600	14.6	31	44	45		occasional wispy cloud
15:51	r1			30	86	17		lots of low cloud & precip in last rh profile
15:57	r2	2600	14.5	28	48	45		lots of cloud and precip in last rh profile
16:02	r2	2600		25	85	15		"" "" " etc
16:10	p3							profile to 8000ft eos for wet neff, chiller off
19:43		4000	14.7	28		45		New data file for this run as software was stopped. B424B
19:48		4000	14.5	28	85	14		very noisy, probably still in cloud!
19:57								probley all cloud. EOS.